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Illustrated.

The Engineering and Mining Journal

MAY 6, 1911.

Production of Copper in 1910

We present herewith our revised statistics of the production of copper in 1910, which will be found not to differ materially from what we reported in our issue of Jan. 7. These statistics are the compilation of reports communicated officially by all of the producers, and are based uniformly upon the fine-copper content of the blister-copper production of works converting matte, plus the production of the Michigan smelters. This puts the statistical investigation upon the same basis and eliminates the error inevitably arising from reckoning the copper in different stages.

PRODUCTION OF COPPER IN THE UNITED STATES

(In Pounds)

State	1909	1910
Alaska	4,057,142	5,008,171
Arizona	292,042,829	299,606,971
California	53,357,451	45,793,894
Colorado	10,487,940	10,127,012
Idaho	7,770,010	6,216,461
Michigan	227,247,998	221,400,864
Montana	313,838,203	286,242,403
Nevada	51,835,309	63,877,500
New Mexico	5,134,506	3,632,351
Utah	100,438,543	125,042,381
Wyoming	89,654	180,861
East and South	22,837,962	18,195,450
Other States (*a*)	3,746,895	925,664
Totals	1,105,336,326	1,086,249,983

(*a*) Includes copper of which it is impossible to determine the origin.

PRODUCTION OF COPPER IN NORTH AMERICA

(In Pounds)

Country.	1909	1910
United States	1,105,336,326	1,086,249,983
Canada	47,677,361	52,492,282
Mexico	126,169,962	137,797,222
Cuba	6,627,028	7,799,764
Totals	1,285,810,677	1,284,339,246

As in previous years the smelters have gone to much trouble in enumerating the origin of their copper production. Our distribution according to States is based upon their data. For various reasons, however, this distribution can never be precise. Smelters receive some copper of which the geographical origin is unknown to them. They receive a great deal of copper from other smelters and know nothing as to the origin beyond the works whence received. And the tracing of such copper back through the works whence shipped as matte often develops important differences between their production and receipts in any given year. Even in the possession of full data a good deal depends, therefore, upon the judgment of the statistician.

For the same reason, also, the distribution of the production among the several countries of North America may not be absolutely correct, but such error as may be "plus" in one case will be correspondingly "minus" in another. The grand total is, of course, the figure especially to be relied upon.

SMELTERS' PRODUCTION

(In Pounds)

Source	1909	1910
North American ore	1,285,810,677	1,284,339,246
Foreign ore (*a*)	38,717,143	41,976,733
Scrap (*b*)	12,451,884	10,962,099
Totals	1,336,979,704	1,337,278,078
To foreign refiners.	33,642,944	33,855,800
To American refiners	1,303,336,760	1,303,422,278
Blister copper imported (*c*)	135,397,646	146,185,104
Total crude copper	1,438,734,406	1,449,607,382

(*a*) Exclusive of ore derived from Canada, Cuba and Mexico. (*b*) Reported by ore smelters only. (*c*) Exclusive of copper received from Canada and Mexico.

REFINERS' PRODUCTION

(As reported by Copper Producers' Association)
(In Pounds)

Class	1909	1910
Lake	226,602,134	221,400,864
Electrolytic	1,101,518,458	1,151,624,597
Casting	34,123,446	32,193,196
Pig	43,159,018	46,903,463
Totals	1,405,403,056	1,452,122,120

Besides the copper produced from scrap by smelters who treat such material along with virgin copper there is a considerable production by smelters who treat such material alone. Those concerns reported a production of 23,480,000 lb. in 1910, against 33,348,000 lb. in 1909. The total quantity of copper recovered from old material was, therefore, 45,799,884 lb. in 1909 and 34,442,099 lb. in 1910. The decrease in this business under the influence of low prices is probably normal.

The Anaconda Smoke Decision

The opinion written by Judge Ross, of the United States Circuit Court of Appeals, in the case of Fred J. Bliss vs. the Washoe and Anaconda Copper companies, has recently come to hand, and it is hoped marks the close of this remarkable and important litigation, popularly known as the Anaconda "smoke case."

As announced some weeks ago, the Court of Appeals decided in favor of the Anaconda company, confirming the opinion of the master in chancery and the trial judge. A mass of testimony of extraordinary length was taken, the records in the case comprising over 25,000 printed pages.

A feature of the case was the great diversity and contradiction in the expert testimony. This was also the case in respect to the lay testimony, and probably resulted from the selection of individual cases as a basis of the testimony. There was so much variance in the latter that the judges took trips through the so called "smoke zone" to get a general view of the situation and extent of damage, if any. In the opinion written by Judge Ross, who was himself a farmer, he considered that there was no damage of general extent, and that there was no warrant in fact for the closing of an industry that was paying out millions of dollars annually, and that had practically fostered and provided markets for the complainant's product.

In this connection it was brought out that since the erection of the reduction works at Anaconda, the value of the product of the Butte mines to the date of the trial had been over $500,000,000. That the amount of money annually paid by the defendant companies and the companies shipping ore for treatment at the Washoe works was approximately $10,000,000 for labor, $2,800,000 for railroad freight, $4,000,000 for coal, coke, lumber, etc., and that the Washoe smeltery during those years had produced from 8.2 to 11.5 per cent. of the entire world's supply of copper.

Damage from the old works prior to 1903 was admitted and had been paid for by the company. Some of the animals paid for at that time, however, were brought in as evidence in the later suit to close the new works and were so identified by one of the witnesses. It was contended by the company, and its contentions were considered by the judges to have been upheld, that while slight damage may have occurred since the new stack was erected, this damage was not appreciable as a whole, nor in any way comparable to the benefit the community and the State received from the mining and smelting industry.

In view of the importance of the case the mandate of the Court of Appeals is stayed for six months, to enable the appellant to apply to the Supreme Court for a writ of certiorari, should he so desire. It is not anticipated, however, that the case will be appealed further.

One case only is now pending, viz., the action of the Government against the Anaconda company on the ground that the latter has been damaging national forests. Even this promises to be adjusted in a rational way, the Government having just appointed a commission, consisting of Dr. J. A. Holmes, Dr. L. D. Ricketts and John Hays Hammond, to act in an advisory capacity and consider the value of ameliorating methods that may be presented, with the idea that the Government may be able to recommend to the company some solution of the problem. As we have previously stated the company itself has devoted much energy and money toward such a solution, and if the Government or anybody else can make a practicable suggestion, we are quite sure that the company will quickly adopt it. In the meanwhile the Government will probably suspend action in its suit.

Miners' Phthisis

The compensation bill for sufferers from miners' phthisis, now under consideration in South Africa, is a new land-mark in the growing list of workmen's compensation bills. Briefly, this measure provides, after two years from the passage of the act, for a payment of £250 to any white man who has worked as a miner for a period or periods aggregating two years or more and has thereby contracted miners' phthisis, and of £500 to any miner who has contracted both miners' phthisis and tuberculosis of the lungs, one-half the sum to be recoverable from the employers during the two-year period, the other half from the government. Other retroactive clauses provide for various forms of compensation for miners who become affected in the interim period before the regular working of the bill begins. Forfeiture of the right to recover is incurred by beginning work in the mines and concealing previous illness from miners' phthisis; by beginning work if a sufferer from tuberculosis; by being convicted three times of disregard of the regulations for dust prevention; and by prolonged absences from the Union of South Africa.

The compensation bills in civilized countries generally are progressing through the stages of life, limb, and health. (Unfortunately we are not all advanced to this last stage, or the present phosphorous-match industry would be instantly eliminated.) However, there seems to be a string on the present bill which may not be entirely satisfactory to the white laborer. It seems certain that such a compensation bill will act as a decided stimulus to the invention and utilization of mining machinery, thus cutting down the number of men employed per thousand tons of ore produced, and that the employers will use the utmost efforts to increase the proportion of black labor underground.

Bounties on iron and steel made in Canada are to cease this year, according to the Dominion finance minister, who announces that he will not ask Parliament for any further grant after the expiration of the term set by the present law. The companies affected have made no serious protest against this action, though some of them have suggested an advance in import duties by way of compensation. The iron and steel interests of the Dominion are in a fairly prosperous condition, and their growth seems assured with the increase of population and business.

Unlike some of the more important metals, platinum during the last year has not only held its own, but advanced materially in price. This is the result of an increased demand with an almost stationary supply. At the present time an ounce of refined platinum is worth two ounces of fine gold. Under these conditions it is to be expected that further supplies would be sought, and it is understood that systematic exploitation is to be undertaken of placers in Columbia, which are believed to be rich, but have heretofore furnished only an irregular and intermittent supply.

North Butte Report

On account of the condition of the copper market during 1910 the mines of the North Butte Mining Company were operated at only 80 per cent. of their capacity, 419,710 wet tons of ore being shipped. There were treated at the smeltery 408,528 dry tons, of which 38,043 tons, or 9.3 per cent. were first class, and 370,485 tons, or 90.7 per cent. were second class. From this ore 25,267,092 lb. of fine copper; 988,191 oz. of silver, and 1196 oz. of gold were produced. The average prices received for metals produced during the year were: Copper, 12.771c. per lb.; silver, 54.503c. per oz.; gold, $20 per oz. The dry tons of ore mined and shipped during the year were produced as follows: Edith May stopes, 243,986 tons; Jessie stopes, 104,590; South Gem stopes, 12,290; miscellaneous stopes, 6604; development and repairs, 41,058; total, 408,528 tons.

The company has purchased the remaining one-quarter interest in the Snowball mining claim, and a one-half interest in the Carlile and Protection lode mining claims, all in Silver Bow county, Mont., and has sold its three-eights interest in the Emily and Millview claims to the Anaconda Copper Mining Company. The litigation over one-quarter of the capital stock of the Berlin company has been settled, and the company now owns all of the capital stock of the Berlin company. The litigation with the Tuolumne company was settled on Nov. 28, 1910.

The year's work shows 18,799 ft. of development work done. The Speculator shaft was sunk 312 ft., giving it a total depth of 2560 ft., and since Jan. 1, 1911, it has been carried to the depth of 2775 ft. The Granite Mountain shaft has been carried from the 500 level to the 1800 level by raising, and is now being enlarged to three compartments from the 1800 level to the surface. Development on the Edith May vein consisted in sinking a winze 112 ft. below the 2200 level between the faults, and in drifting from the bottom of the winze, east and west a distance of 210 ft., going practically to the faults in both directions. Work on the Adirondack vein disclosed no bodies of pay ore, but showed the vein to be continuous for a distance of 450 ft. The mine was operated 329.5 days; the number of men employed averaged 870.7, and the number of tons hoisted averaged 1274.5 per day.

On Jan. 1, 1911, the ore reserves amounted to about 958,680 tons, assaying 4.25 per cent. copper and 3 oz. silver. It is stated that the management does not wish to develop the ore reserves too far ahead of the stoping, as the maintenance of the openings becomes a heavy source of expense. The balance of receipts over expenditures, exclusive of dividends, amounted to $1.36 per share in 1910, $2.50 per share in 1909, $4.66 in 1908 and $9.06 in 1907. Dividends paid amounted to $446,000 in 1910, and there are now 410,000 shares of stock outstanding, at a par of $15 per share.

Mining in the Black Hills

DEADWOOD CORRESPONDENCE

Operations at the Gilt Edge-Maid mine have been started in aggressive manner. N. Treweek, who is in charge, will open the King tunnel and put it in shape to furnish an outlet for the large tonnage that will be mined by the "gloryhole" method from oreshoots above that level. It is expected that, by the time the mine is in shape to produce, the concentrating plant will be ready, as construction will be started soon. The concentrates will be handled by the Osterman smeltery, work on which is progressing.

On May 6, unless another postponement is allowed by the court, the mining and personal property of the Hidden Fortune company will be sold to satisfy claims amounting to $36,000. The claims consist of taxes, receiver's expenses, etc. The sale to be made will be absolute—no redemption will be allowed. Stockholders of the company have endeavored to raise the necessary money to save the property but have apparently failed, and it looks now that the title will pass to outsiders. It is quite probable the Homestake and Golden Reward companies will combine and make the purchase, the former company retaining the mineral land and the Golden Reward taking the mill.

Shaft sinking was resumed at the North Homestake, at Maitland, during April. The shaft is 220 ft. deep, penetrating the ore deposits in quartzite, and additional depth is to develop orebodies in the primary formation, located by diamond drilling.

Milling will be resumed at the Minnesota, in the Maitland district, as soon as a tunnel, now being driven, penetrates the oreshoot for which it is headed. This work will probably be done by the end of May.

The Golden Slipper, in the Hill City district, is producing some high-grade free-milling quartz. The vein recently faulted, and when picked up showed a 3-ft. face literally sprinkled with gold. It will mill $50 per ton. The mine is equipped with an antiquated stamp mill, but all tailings are being impounded.

Fire Protection for Geological Survey Records

WASHINGTON CORRESPONDENCE

An investigating committee of the House of Representatives, which is visiting public buildings with a view to ascertaining how far they are in danger of fire, has visited the Geological Survey office and finds that it is in an unsatisfactory condition. Director Smith has stated plainly that the condition of the building and the unsatisfactory character of the accommodations of the Survey are well known to him and that he has simply been obliged to make the best of the facilities such as they are. It is probable that when the committee reports to Congress it will refer to the conditions surrounding the work of the Geological Survey. This may operate to secure the rectification of matters that have frequently been called to the attention of Congress in a less pointed way in the past.

Minnesota Iron Ore Notes

DULUTH CORRESPONDENCE

While ore has been loaded into cars at the Kennedy mine on the Cuyuna range, none has gone into the dock yet. Some delay has been experienced in grading the approach to the dock, but shipments will start in a few days.

Provision is being made by the Great Northern Railroad to operate 45 crews on its ore trains this season, between the range and the Allouez docks. This is five more than were used last season. Five hundred additional ore cars have been added to the equipment for this season. At present about 150 to 200 cars of ore are arriving at the docks daily. With the clearing of the steamer "L. C. Hanna," on April 22, loaded with ore, the season officially opened. While no great activity is looked for for several weeks yet, there are several boats in the harbor that will probably clear with ore in a few days.

Chronology of Mining

April 1—Strike of coal miners in Alberta and British Columbia.

April 3—U. S. Supreme Court upheld commodity clause of the interstate commerce law which prevents a railroad from owning stock in a coal corporation along its lines.

April 7—Miners on strike in Alberta and British Columbia agreed to submit the wages dispute to arbitration.—Seventy-three killed in explosion in Pancoast coal mine at Throop, Penn.

April 8—Explosion at Banner coal mine, Birmingham district, Alabama; 128 killed.

April 10—First shipment of copper ore from Cordova, Alaska.

April 11—U. S. Steel Corporation inaugurates its $5,000,000 coke-oven plant at Gary, Ind.

April 19—Strike of zinc smelters at Bartlesville, Okla.

April 21—Cut of 50c. per ton in Lake iron-ore price.

April 24—Explosion in Ott mine, No. 20, of Davis Coal and Coke Company, near Elk Garden, W. Va., killed 10 men.

April 27—Settlement of zinc smelters' strike.

Gypsy Grove Breaker Burned

SCRANTON CORRESPONDENCE

The Gypsy Grove breaker of the Pennsylvania Coal Company at Dunmore, a suburb of Scranton, was entirely destroyed by a fire which started at 4:10 p.m. on April 28. Two men were incinerated in the breaker after the blaze started and four were seriously injured. The two men who were killed were working at the top of the breaker; the other four employees were at work in other parts of the structure at the time of the outbreak, but succeeded in escaping with their lives.

There were four hundred men working in the mine at the time the fire broke out and all succeeded in making their escape. Although the alarm created among the miners in the various veins was great, with the recollection of the Pancoast disaster fresh in their memory, yet, as a matter of fact, little or no smoke from the breaker found its way into the mine. Although the breaker had been built over the main shaft, there were three air shafts and a slope through which the men readily reached the surface, without other injuries than a few scratches and bruises incidental to climbing through the shafts, the ladders in the shafts having become decayed.

After the first slight panic that ensued when the men were informed that the breaker was on fire, those in the veins behaved with admirable coolness throughout their trying ordeal. Captain W. A. May asserted positively that at no time during the fire was there the slightest danger to the miners who were at work in the three veins. When the fans were turned off, the fire instead of sending smoke into the mines created a natural current through the gangways.

It was different, however, in the breaker where there were about 50 boys working at the time the fire was discovered. These youngsters made their escape as best they could, happily without injury to any of the lads. A man named James Dykes had a singular escape from death. He was working at the top of the breaker, in the place where the two men lost their lives. In fact he stood fascinated watching the flames enveloping an unfortunate check weighman named John Early, when he suddenly realized that the flames were approaching himself. At this moment he saw the carriage disappearing down the shaft. There was only one thing to do, to grab hold of the carriage rope; this he did and was carried down the shaft over 175 feet.

The cause of the fire was a spark from a passing locomotive falling on a tar-covered roof on one of the lower portions of the breaker. The breaker was a mass of ruins in less than an hour. The estimated loss involved in the destruction of the breaker is stated by the officials of the Pennsylvania Coal Company to be $50,000. The Gypsy Grove breaker was built in 1866 and was one of the oldest in Lackawanna county. Its capacity was only 800 tons per day. It was built over the shaft, the law requiring the breaker to be 200 ft. distant from the mouth of the shaft not having been passed when the Gypsy Grove was erected. The mine will continue working as usual, the coal being brought from the mine to the surface through the breaker of the No. 1 colliery.

Oil in California

SAN FRANCISCO CORRESPONDENCE

California fields produced an aggregate of 6,341,603 bbl. (net) of crude petroleum in March, an increase of 1,001,883 over February. The total increase embraced all fields except Ventura, where the decline was slight. There was a daily average increase in all fields except McKittrick, Santa Maria and Summerland. The San Joaquin Valley district, embracing Coalinga, Kern River, Maricopa, Midway, McKittrick, produced a total of 4,952,967 bbl.; the Coast regions (Santa Maria and Summerland), 540,607; Southern fields (Salt Lake-Sherman, Los Angeles, Whittier-Coyotes, Fullerton-Puente, Newhall, Ventura), 842,029. Field consumption totaled approximately 400,000 bbl. There were 5086 active producing wells, and 600 idle, being an increase over the active producers of February and a decline in idle wells. Wells drilling, 844; suspended drilling, 112. There was a decrease in stocks of approximately 2,000,000 bbl., the exact figures being unavailable.

The annual meeting of the Independent Oil Producers Agency, at Bakersfield, April 12, reëlected the following officers: L. P. St. Clair, president; Stanley Morsehead, vice-president; W. B. Robb, secretary; M. V. McQuigg, treasurer. The following directors were elected: H. H. Welsh, S. A. Guiberson, Jr., George A. Scott, Timothy Spellacy, E. L. Doheny, Thomas A. O'Donnell, C. J. Berry, W. L. Stewart, H. U. Maxfield, F. N. Scofield, M. L. Requa. A resolution was adopted for the issuance of storage certificates to cover 8,000,000 bbl. of oil held by the agency in steel and concrete tanks, and not covered by former certificates. A plan for the formation of a storage company to build tanks, purchase the present stocks of oil held by the agency and hold it out of the market for three years was favorably considered. The following new companies had their contracts ratified: Ojai Valley, Republic, Black Jack, Aladia, Hatton, Vandever, Brad, Coalinga South Pole.

The prospect for the substitution of oil for coal fuel in the Pacific transport service of the United States Army is not at present encouraging.

March Operations at Goldfield Consolidated

During the month of March, 1911, the total production of the Goldfield Consolidated Mines Company was 25,714 tons, containing $1,119,952 or $43.55 per ton, of which 95.45 per cent. or $41.38 per ton was recovered. The net profit for the month was $846,283 or $32.91 per ton.

During the quarter ended March 31, 1910, 76,681 tons of ore were treated from which was recovered $2,696,665 at a total cost of $599,713.

MARCH OPERATING COSTS AT GOLDFIELD CONSOLIDATED

Mining:	
Development	$1.22
Stoping	2.21
	$3.43
Transportation	0.10
Milling	2.44
Marketing	1.22
General expense	0.56
Bullion tax	0.63
Construction	0.17
Total cost of operation	$8.55

In developing, 3960 ft. of work was done. In the combination mine an orebody was opened in the foot-wall of an old stope on the second level, that has produced 565 tons of ore worth about $169,500, or about $300 per ton. It is impossible to estimate the extent of this orebody but the indications are that it extends to the surface, at least 50 ft. above the present back. The stope is now 20 ft. long and 15 ft. wide, and is being extended in length.

In the Mohawk mine the 354-sill has been considerably extended, and has produced 1320 tons of ore worth $66,000, or $50 per ton, and nearly 100 ft. further into the foot-wall another orebody was cut that seems to be from 8 to 10 ft. wide. On this shoot, 100 ft. of drifting has been done and has produced 430 tons of ore worth $38 per ton. This is probably a branch from the big orebody cut in the 354-sill.

In the Clermont mine the downward extension of the 306 orebody on the 600 level (near Laguna) was cut by an intermediate 40 ft. vertically under the 600-ft. level. Not enough work has been done to estimate either tonnage or value of this orebody. In the 750 north drift 6 ft. of $15 ore has been cut. The face of the drift is still in ore. The indications, however, are that it is not a long shoot. Nothing of importance has been found in the Red Top, Grizzly Bear, or Laguna.

The mill at the present time is crushing about 900 tons per day, and no difficulty whatever has been experienced in supplying that amount of ore. The Red Top and Combination mines are being operated on the day shift only, and with the exception of the Clermont, the mines are closed down every Sunday. During the month a half interest in the Vinegerone claim was purchased for $195,000 from the Jumbo Extension company. For April, a net profit of $750,000 is predicted.

Correspondence and Discussion

Calculation of Ore Reserve

In most of the articles on mine sampling that have been published in the technical journals, but little mention has been made of the proper methods of determining what volume of ore in place should be used in reducing measurements of ore in cubic feet to tons.

After a careful measurement of the ore by survey, and accurate determination of its value by assay, it is quite a prevalent practice to assign empirically a tonnage factor, taken from a table of typical weight-volumes of ore, or to rely upon judgment and previous experience. The error in calculations by selecting the wrong factor may easily amount to 20 per cent. and more.

On the other hand, in an attempt at great accuracy, the pycnometer is used to determine the density of ore. In such instances the sample on which the determination is made is usually a composite sample made from a portion of all the samples taken for assay. The ore is in a finely pulverized state and such a determination gives the correct density of the ore in that condition.

Both methods are inaccurate or unreliable, as the occurrence of any class of ore, insofar as density is concerned, is so variable that tables of typical weights are useless. An ore may be homogeneous in composition but cellular in structure, or cavities or vugs may exist in the deposit and factors taken from the tables or determined by pycnometer may give erroneous results for this reason.

Perhaps the safest method of determining the weight factor is to select, from a number of places in the deposit, large pieces of ore typical of that particular orebody and to make density determinations from these and use the average of all the determinations. It is best to use as large pieces of ore as can be carried without overloading the balance.

In many instances it is necessary to make allowances for the barren "horses," large vugs or faults that may exist in the deposit, and which reduce the quantity of valuable material in any developed block of ground. The selection of the proper factor for safety must be made from evidence gathered by an inspection of the ore faces in the mine workings and calls for the best judgment, based on experience of the engineer.

When the factor for waste is large, the estimation of reserves is but an approximation, and the conservative engineer will often use the phrase "minimum estimate of reserve" when it is impossible to arrive at any degree of accuracy. By that it is meant that dependence upon

Views, Suggestions and Experiences of Readers

a minimum tonnage of ore from a particular block can be made and the chances are that a greater tonnage may be mined.

The particular point that I wish to emphasize is that, after accurately measuring and sampling positively developed ore, the determination of tonnage is often a mere approximation and that in order to eliminate as many factors of error as possible, careful attention should be paid to the determination of the weight per unit of volume of the ore as it occurs in the deposit.

STANFORD RICHARDS.

Santiago de Chilé, March 27, 1911.

Handling Smelting Gases

The data in the article by Claude T. Rice on copper smeltery gases, in the JOURNAL of March 25 should be appreciated by all interested in the baghouse system of handling gases and much credit is due those in charge of the plants described, for the information given. Having had, for a number of years, experience with baghouses at Cañon City, Colo.—the pioneer baghouse of the West and situated in a region not surpassed for farm products and fruit—I offer a few more points to those already brought out. While more zinc ozide was present in the gases handled at Cañon City than at the plants referred to by Mr. Rice, yet there are many points of similarity.

Regarding short but wide dust chambers, I will say that they have been used at Cañon City since the plant was built by Dr. F. L. Bartlett over 20 years ago and it has always been recognized that these chambers were valuable for settling flue dust. About four or five years ago, we built inside of the present settling chamber, a hood over the intake of the flue-line, so as to turn the fumes downward. At the other side, at the outlet, we built a baffle wall so as to turn the fumes upward and found that there was fully 50 per cent. more flue dust adjoining and immediately under this baffle than in the center of the room, showing clearly that minute particles as light as zinc oxide would have a tendency to settle when coming in contact with an object at low velocity, especially in a large room.

The article conveyed the idea to me that the furnaces at the California plant were run with a hot top entirely to effect an elimination of sulphur. This is good as far as it goes, but it seems to me that it is an evident essential that a hot top be maintained to make the required zinc oxide for neutralizing the fumes. If a hot top is not maintained it is doubtful, in my mind, if the required amount of zinc oxide would be made to meet the requirements. If such were the case it would have to be put in mechanically, or made, as at the Midvale plant by a roasting furnace similar to those used at Cañon City.

These facts were clearly brought out in operations at Cañon City. There the intention was to make enough zinc oxide at the furnaces to offset the lead sulphate made at the roasters. These furnaces had an ore column not exceeding three feet. Just as soon as the tops were allowed to cool, the percentage of zinc oxide in the fumes decreased and the zinc contents of the slag increased, showing clearly that if it is the desire to make zinc oxide in the furnace, it is essential to carry a hot top or lose a good portion of the zinc in the slag. It appears to me that the maintaining of a hot top to drive zinc into the fume is certainly of equal, if not greater, importance than for oxidizing the sulphur when smelting pyritically.

CONTINUOUS DISCHARGE FROM BINS

The matter of continuous discharge from the baghouse bins certainly is a step in the right direction, not alone in the way of material being saved, but in the relief from the continuous annoyance experienced by the men working at the baghouse when a slight breeze blows the dust into their eyes, causing a smarting sensation. That a screw conveyer can be arranged to handle this product was long ago demonstrated. The fact that not a single bag has been lost during the three and one-half months of operation of the baghouse, is mentioned as "something remarkable." No doubt it would be if any neutralizer were not used, but under the present system I, for one, fail to see why the bags should not be used for a long time. I know of bags lasting as long as six years. While I know the conditions vary in different places, at the same time, if the Cañon City plant and the Globe plant at Denver can use bags for a long time, and the two plants are entirely different, I can see no reason why more plants should not be equally successful allowing perhaps for some minor changes.

Here it might be well to mention a few points in regard to the care of bags after they are installed. As stated in the article, never let the heat rise above 110 deg. C. While a good woolen bag will

stand a higher temperature, it is folly to crowd the danger line. Also have bag area enough so that the pressure at the bags is not over 2 oz.; a little less is better. Great care should be used in the selection of the thread for making the seams, as frequently this thread is so poor the bags rip for several yards, especially if the pressure rises on account of the bags not being shaken often enough. Bags should be carefully hung. If too much slack is allowed, a pocket will form at the bottom where the bag is fastened to the nipple. When the bags are shaken, the material will fall and lodge in the pocket and remain there until taken out. Then, if an opportunity is given, even to a small degree, for moisture to accumulate the bag will soon lose its life at that point. The plan practised by the New Jersey Zinc Company, I think a good one; that is, when a section of a baghouse is not used for some time, all the bags are taken down, shaken out well and stored in an absolutely dry place to be used as repair bags when others fail.

The use of sulphate and oxide of zinc, as a binding material for briquets no doubt is good, and only those of us who have handled such light dust dry or by mixing with water direct, can appreciate the value of mixing with the ordinary flue dust in the way described. The fact that the baghouse is less written about than other metallurgical appliances makes us appreciate the article all the more and hope for further contributions.

F. W. BOCKING.

Alma, Colo., April 13, 1911.

Cooperative Mine Rescue Work

In the investigative work of the Bureau of Mines, it becomes necessary at times to employ temporarily miners who have been trained in the use of breathing apparatus. It is the desire to procure for such service miners whose training renders them most efficient.

To extend the list of available miners trained in the use of breathing apparatus by the bureau, it is proposed to conduct supplemental training of miners trained at private or State stations and to issue rescue-training certificates to all who prove themselves eligible.

In this coöperative work the bureau will follow the scheme outlined below:

(1). Representatives of the bureau, upon invitation, will inquire into the facilities provided by mine owners, States or organizations for furnishing instruction and training in the use of breathing apparatus; and such stations as appear adequately equipped will be recorded as coöperating training stations.

(2). Men trained in the use of breathing apparatus at such stations will, upon application, be invited to appear at Government rescue stations or cars for examination for the receipt of a Bureau of Mines' certificate of training; or will be examined by Government engineers or foremen at private stations when such procedure is practicable.

(3). Those persons who pass the examination will be certified to this bureau for record and the issuance of a certificate. Applications for record as coöperating training stations, or for supplemental training for a Bureau of Mines' certificate, should be made to the Bureau of Mines, Pittsburg, Penn.

J. A. HOLMES,
Director, Bureau of Mines.

Washington, D. C., April 29, 1911.

The Lake of the Woods District

Recent discoveries made in the resumption of development in the old gold mines of the Lake of the Woods area in the Rainy River district of Ontario have created much excitement in mining circles, and in the opinion of many this district is likely in the near future to prove a formidable rival to Porcupine. The report of a rich strike at 100 ft. on the Ophir has been fully confirmed, and what is of more importance the existence of a large body of low-grade ore has been proved. At the Mikado a drift has been run on the seventh level at a depth of 480 ft. in ore for 250 ft. Operations have been started and machinery is being installed on several other properties.

TITLE DIFFICULTIES

The cessation of activity in this undoubtedly rich gold area for an interval of 20 years has a most important bearing on the question of mining titles, which is now coming to the front in British Columbia, in connection with the claim put forward by the Cowichan Indians to a large area of that province, including the Cowichan valley. The stoppage of work in the Lake of the Woods area 20 years since was due to a question of disputed jurisdiction between the Dominion and Ontario governments. The Canadian Pacific Prospecting and Mining Company which operated under a Dominion title was putting down a shaft on the Ophir when work was stopped by an injunction issued by the late Judge McMahon on behalf of the Ontario Government. At that time the company had refused an offer of $250,000 for the property. Protracted litigation resulted, the case being finally decided by the Imperial Privy Council in favor of the Ontario government a few years since after about $100,000 had been paid in costs. The capital invested was largely English and the dispute not only prevented the development of the district but tended to discourage the investment of British capital in Canadian mining enterprises.

The claim of the British Columbia Indians to the Cowichan valley rests on a proclamation issued by King George III in 1763 restoring to the Indians all lands not included within the limits of the then existing colonial governments or the Hudson Bay territory, and forbidding all settlement upon them until duly purchased or ceded by the aboriginal owners. The province of British Columbia has ignored the Indian title, and after frequent appeals to the Provincial Government without result the Indians have petitioned the British Government for redress. They have retained as counsel J. M. Clark, K. C., of Toronto, a leading authority on constitutional law, who has successfully argued a number of cases before the Imperial Privy Council, including the Ophir mining case. The petition of the Indians was referred by the British Government to the Canadian Government which thought that in the first instance the matter should be referred to the Supreme Court of Canada. The Government of British Columbia, however, has refused to accept this proposal. The claims of the Indians were urged on the Government at Ottawa this week by a deputation from an organization called the Friends of the Indians, in reply to whom Premier Sir Wilfrid Laurier stated that he did not see how the British Columbia Government could be forced into court, and that the whole matter would be referred back to the British Government. Mr. Clark states that it will be taken to the Privy Council and that the case rests on the same legal points as regard Indian titles as governed the decision in the Ophir case. Should the rights of the Indians be sustained, it follows that the British Columbia Government has no power to grant lands until the Indians have surrendered their rights and that all grants hitherto made within the territory covered by their claims are invalid.

PHILIPS THOMPSON.

Toronto, Ontario, April 29, 1911.

Cyanide Antidotes

In the JOURNAL of April 8 R. S. Black infers "inexcusable negligence in providing antidotes in cyanide mills throughout Australia and I do not doubt that the same is true in other countries."

If our memory does not fail us, Mr. Black must be doing an injustice to the chief gold mines of the world, including the great John Taylor companies in India, the Bewick-Moreing and other companies in Australia, and some of the best known companies in South Africa, Eastern Asia, Central and South America, that we know must be provided with these antidotes and with full instructions for using them. The antidotes were sent to these mines by us at the date of, or subsequent to, our furnishing them with equipment. We may add that for the benefit of the mines in Spanish America special instructions in Spanish have also been prepared.

THE CYANIDE PLANT SUPPLY COMPANY.

London, April 19, 1911.

Details of Practical Mining

This department is designed to treat in a brief way of details of everyday practice. Many readers are doing interesting things in mining and milling that other readers like to know about. The thought that there is nothing new in them should not be a deterrent of telling about them. Something that is an old story in one district may be quite unknown in another. Our draftsmen can develop any kind of pencil sketch that is intelligible. A blueprint answers all the purposes of the engraver. Contributions are solicited.

Notes of Interest to Prospectors and Operators of Small as well as Large Mines Things that have to be done in Everyday Mining

Transit Bar for Shaft Alining

BY L. E. IVES*

In using a transit for shaft-alining work, the ease and rapidity with which a set-up can be made depend largely upon the dip of the shaft. Up to a dip of 50 deg. from the horizontal, the ordinary tripod can be used almost as readily as for work on surface. For a dip between 50 and 70 deg. it becomes necessary to use a short leg on the tripod in place of one of the ordinary length. If the dip

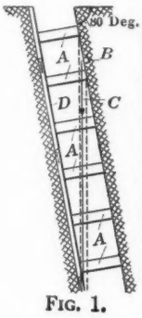


FIG. 1.

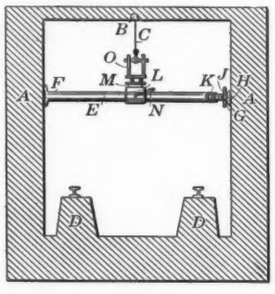


FIG. 2.
The Engineering & Mining Journal

TRANSIT BAR IN A SHAFT

is greater than 70 deg. it is impossible to do rapid work with a tripod. Under these conditions, if the set-up is finally made, it is extremely difficult for the observer to shift his position without disturbing the set-up. Not only that, but the movement of the skip on the rails, although possibly several levels below, in the majority of cases jars the instrument. If one leg of the tripod, for instance, rests against a stringer, nothing else must touch that stringer. With a number of helpers working around, it is difficult to keep the instrument leveled. In a shaft where concrete supports and stringers are used, it is difficult to secure sufficient footing for either the instrument or the observer, regardless of the dip.

The transit bar shown in the accompanying illustration was designed primarily for use in a shaft dipping at 80 deg. from the horizontal and in which all stringers and supports are of concrete. As can be readily understood, the conditions are somewhat difficult to contend with for transit work. The device was built along the lines shown and has given entire satisfaction.

In Fig. 1 is shown a vertical cross-section through the shaft. The concrete dividers, are shown at *A* and the concrete stringers at *D*, *B* is a plug driven into a drill hole in the back, and holds a spud from which the plumb line *C* is suspended. The dotted lines show the extreme position that the plumb line might take, were it suspended anywhere in the back between any set of dividers. It will be noticed, therefore, that the space between the dotted lines on any divider is small. In short, because of the high dip, no matter where a plumb line is hung, in the back, a bar placed between the set of dividers next below will intersect the plumb line, if the bar is moved only a short distance along the dividers, either toward the foot-wall or the hanging-wall.

In Fig. 2 is shown a concrete set, with the stringers, rails and the bar in position. The bar itself *E* is made of steel, possibly 2½ in. diameter. One end *F* is rigid and has a milled head similar to the ordinary drill post. The other end has a movable head which by means of the thread and screw at *K* and the handle *J*, is extended or shortened to suit the dimensions of the shaft. There is a ball and socket joint at *G* and the head *H* is also milled. By tightening the handle *J* the bar is clamped between the dividers in a rigid position. The head or carriage *L* can slide along the bar or swing entirely around it in a vertical plane. By means of the handle *N* both movements are locked at any desired point. The carriage is threaded at *M* to receive the transit after the bar is in place and the carriage has been clamped at the proper place. The operation of the whole contrivance is exceedingly simple. First the plumb line is hung from *B*, with a long line.

The bar is then moved up or down along the dividers until the carriage, when it is in an approximately level position, is directly under the point of the plump bob. The handle *J* is then tightened until the whole set-up is rigid. Any minor adjustments are made through the two movements in the carriage. This is finally clamped by the wrench *N*. The transit can then be screwed on, and the final adjustments necessary are slight.

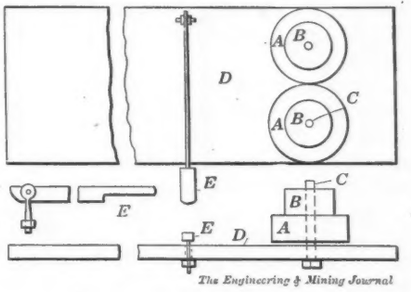
Instead of the usually precarious set-up, this provides one which is rigid and absolutely free from any jarring caused by the movement of the skip. The observer's stage can be constructed entirely independent of this and in such a position as to permit some freedom of movement.

*Mining engineer, 322 Lumber Exchange building, Minneapolis, Minn.

A Fuse Cutting Device

BY GEORGE E. ADDY*

A handy device for cutting fuse is shown in the accompanying sketch. It consists of a board a foot or so longer than the longest fuse that will be required. At the head end two headless



The Engineering & Mining Journal

BOARD FOR CUTTING FUSE

pins *C* about 9 in. long are driven through holes in the board.

Over these pins two reels or disks of wood or tin each with a face of about 4-in. and 4 and 6 in. respectively in diameter are placed as shown. The lower larger disk *A* is for the outer 50-ft. coil of fuse, the smaller disk *B* for the inner roll.

A knife *E* is bolted to the board *D* provided with a weight at the handle which is used for cutting the fuse into the required lengths as it is drawn from the reels or disks.

The advantage of the device is that the fuse must be drawn out straight for cutting so there is little excuse for twisting and it is much easier for a man to gage the lengths cut so as to use the entire rolls without any short left-over pieces.

*Park City, Utah.

Concrete Hot Water Tank

By W. Norton

The accompanying sketch shows the plan and side elevation of a concrete hot-water tank installed during the summer of 1908 at the Alden colliery, near Wilkes-Barre, Penn. The shape of the tank is octagonal. It consists of a tank proper and footing course. The diameter of the latter is 25 ft. 3 in. and of the former 19 ft. 3 in. inside, and 23 ft. 3 in. outside at the bottom. The thickness of the footing course is 3 ft. The tank is 10 ft. deep with the walls 24 in. thick at the bottom and at the top 16½ in., or having a ¾-in. batter per foot.

One cubic yard of the concrete used in building the tank consists of the following materials: 12 wheelbarrows of sand, 4 wheelbarrows of ashes, 3.64 bags of cement and 16 pails of water. This proportion is based on an actual test made with a box holding exactly 1 cu.ft. The tank walls required 44.7 cu.yd. of concrete, containing 3.64 bags of cement per yard, while the footing course required 50 cu.yd. of leaner mixture, in which only 1.4 bags of cement per yard were used.

Construction Costs

The following is the itemized account of the construction: Labor, $173.21; sand (55 loads @ 50c.) $27.50; cement (30½ bbl), $70.78; lumber and nails, $22.50; wire ropes, scrap pieces, $4; total, $297.99.

This makes 94.7 cu.yd. of concrete at $3.14 per yd. The capacity of the tank is 23,184 gal., or 245 gal. per cu.yd. of concrete; it thus cost 1.28c. per gal. of capacity.

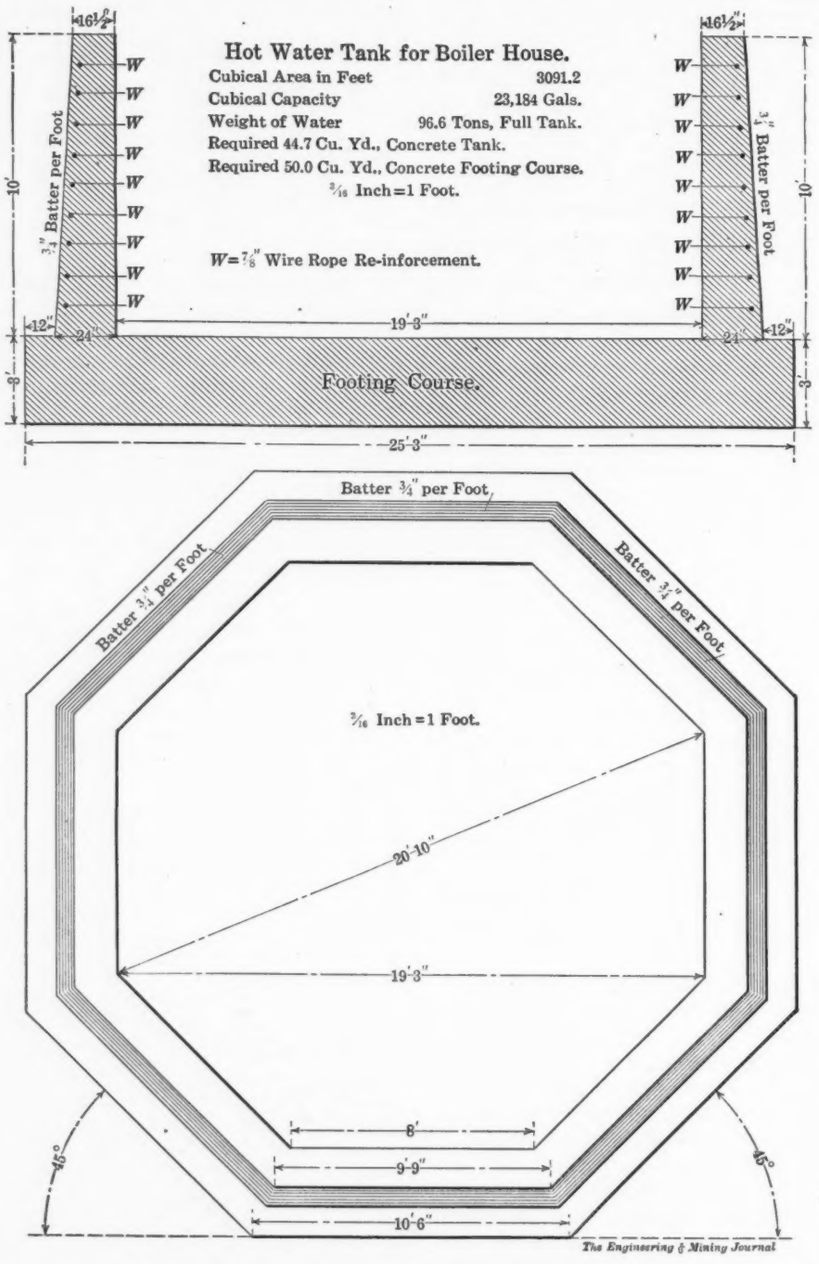
The tank is reinforced with ⅞-in. old wire ropes, which are placed about a foot apart, as shown by *W* in the sketch. After the form was removed, the inside of the tank was faced and plastered so as to fill up all the pores and to prevent leaking. The tank is covered with 3/16-in. steel sheets, which rest on three 56-lb. rails (not shown in sketch). Upon the sheet iron there is a stack 30 in. in diameter, 12 ft. high, and a 2-in. perforated feed-water pipe is placed in the stack.

The flow of feed water is automatically controlled by the elevation of the water in the tank. There are three exhaust pipes connected to the tank: one 6-in. pipe from large air compressor; one 6-in. from a 24-ft. fan, and one 5-in. pipe from the slope engines. The ends of these pipes are about 18 in. from the top.

The temperature of water in the tank, under normal condition, is 170 deg. F. The feed water for the boilers is taken from this tank a few feet below the surface of the water through a 5-in. pipe, which is connected to a Taylor duplex plunger pump, 7½x5x10 in. The power plant consists of four sets of Finger water-tube boilers, 200 h.p. each. The pressure is maintained at 80 to 90 lb. The boiler fuel consists of rice and barley coal in equal proportion. The amount of the fuel used per day is 40 tons. The saving resulting from the use of the hot-water tank has not been determined exactly, but it has been approximately figured as follows:

$$\frac{1153}{1053} \times 40 \div 10 = 4+ \text{ tons}$$

or a total saving of 1000 tons for 250 working days in each year. This is equivalent to at least $750 on an expenditure of $298, or 250 per cent. on the investment.



THIS TANK COST LESS THAN $300, AND SAVES $700 ANNUALLY

Retimbering a Tunnel

By Charles W. Johnston*

A short time ago a tunnel I was driving through old filled ground broke into an old drift. This drift was in good condition, extended some 1000 ft. along the vein in the direction I wished to go, but the floor of the drift was 2 ft. lower than that of the tunnel. Although it made a grade of 0.67 per cent. against the loaded cars, I went back 300 ft. in the tunnel and lowered the floor from that point to the intersection of the tunnel and drift.

The ground was heavy, but as the fill-

*Mining engineer, 39 Penn street, Roxbury, Mass.

ing was largely coarse material, mixed with some clay, the filling did not run easily. It was, however, necessary to drive the lagging to keep pace with the waste extracted. The dip of the vein was 50 deg. The tunnel was driven along the foot-wall; it was 6 ft. wide inside the posts, and 6 ft. 6 in. from floor to bottom of caps. The sets were spaced 6 ft. centers. The timber for posts and caps was cut from 8-in. round poles. Slabs 7 ft. long from a nearby sawmill were used for lagging.

For the first 100 ft., where the maximum that the tunnel was lowered was 6 in., the work was simple, consisting in taking out just a little of the floor and in sinking the ties. For the next 200 ft. the work was done as follows: A pole *A*, Fig. 1, 18 ft. long, planed on two sides, was placed under the center of the caps, and temporary posts *B* were placed midway between the sets as shown. These posts were set upon pieces of 3x10-in. plank and wedges were driven between them and the bottom of the posts. Two pieces *D* of 6x6-in. timber were placed just behind the posts *E* of the sets, and braces *C* were driven as tightly as possible. When the wedges under temporary posts *B* were driven tight, the posts of the set *E* could be removed and the sides of the drift could not cave. After the posts were out of the way, the rock or filling was removed from around the immediate position on which the posts had been resting, and new posts were cut just the proper length, so that the old cap *F* fitted tightly on the new post. After the new posts in the three sets which were worked as a unit were all in position, the wedges under posts *B* were knocked out, pole *A* removed and finally the braces *C* and pieces *D* were taken out.

In the last 100 ft. a modification of this method was used. In a drift 8 ft. high, the side thrust would have been too great for the timbers we had on hand, so instead of using posts 8 ft. or more in length, we made the drift the same hight, 6 ft. 6 in., used the old posts and a new cap. On top of the new cap short pieces of blocking were placed to support the old cap. Lagging was placed on the top of the new caps, and the space between this lagging and the old top lagging was filled partly with the waste from the floor, and partly with short pieces of waste timber. This filling was introduced so that the weight would not be suddenly brought upon the new lagging when the old should break.

A longitudinal section of the tunnel is shown in Fig. 1, a cross-section in Fig. 2, and a cross-section of the last 100 ft. of the tunnel in Fig. 3. As it was difficult to work in the drift with so much temporary timber in the way, only enough excavation was done to set the new posts and the bulk of excavation for lowering the floor was done after the temporary supports were removed.

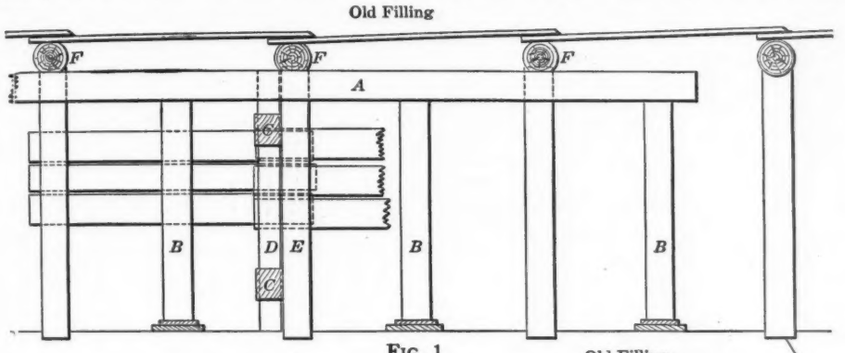


FIG. 1

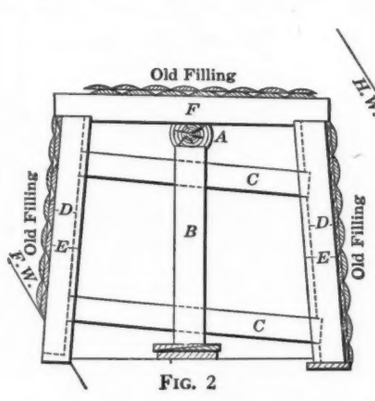


FIG. 2

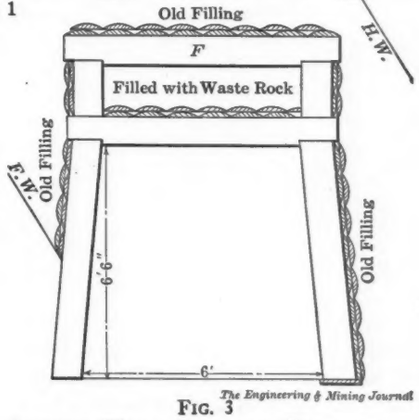


FIG. 3

METHOD OF SUPPORTING CAPS AND LAGGING WHILE REPAIRING POSTS OF TUNNEL SETS

Filling the stopes of the Broken Hill South Silver Company, New South Wales, in 1910, cost 61.1c. per cu.yd., including cost of handling the material both above and below ground.

Making Adobe Bricks

BY N. H. RUBY*

Sun-dried bricks of clay or adobe are extensively used in Mexico and Central America for the construction of all kinds of buildings. The clay is so abundant and widely distributed that it is the cheapest construction material obtainable. The first requirement for the manufacture of adobe bricks is a good soil. This should be of a uniform, heavy, clayey kind, that will adhere well and dry into a hard brick.

Five 1-in. boards are required for making a molding frame. The two long side pieces are usually 29 in. long by 5 in. deep. They are separated by three dividers each 11 in. long by 5 in. deep, one at the center, and each of the other two 2 in. from the ends of the long boards. The frame is held together by screws and also by a wire band passing around the projecting ends of the long side pieces which wire is twisted to draw the ends of the boards tight against the end dividers and held in place by a peg. This twisted wire is also used as a handle to lift the mold. One frame serves to mold two bricks, each 11x5x22 inches.

Three men can make a thousand bricks in three days, at a labor cost of 15 pesos. The cycle of manufacture is as follows: One man picks the soil from a bank, throws out any rock or foreign matter and sprinkles the loose material with enough water to saturate it thoroughly. With a spade he draws it into a bed about 7 in. thick, making sure that there are no lumps and that it is thoroughly wetted. He then sprinkles dry grass cut into 6-in. lengths, thinly and evenly over the bed and again works it over with his spade so as to make a uniform mixture.

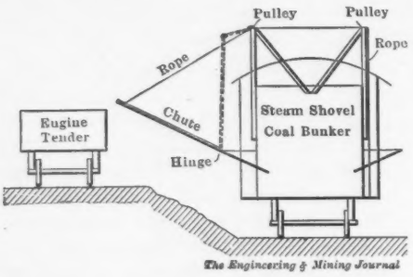
Another laborer scatters a couple of handfuls of dry straw on his empty wheelbarrow, shovels in just enough clay to fill the mold, wheels it over to and dumps it into the mold, which is lying on the ground where the adobes are to be left to dry. The third laborer packs the wet mud into the mold with his hands or feet, levels off the top, draws up the mold by the handles, lubricates the inside of the mold with a wet rag and places it in position to receive the next charge. In a good sun it takes a day for the brick to dry enough so that it can be set on its side to facilitate drying. In three weeks they are ready for use.

While fresh and soft adobe bricks are in danger of being spoiled by animals and rain. An adobe building in Mexico is recognized as in every way superior to a wooden one, having all the advantages of ordinary brick and is much cheaper and can be made on the spot. It is wind, fire and bullet proof, cool in summer and warm in winter, and when well made presents a good appearance

*Parral, Chihuahua, Mexico.

Coaling Steam Shovels

The accompanying sketch shows a device used by the Shenango Furnace Company for coaling steam shovels on the Mesabi iron range. In most cases the shovel is at a slightly lower level than is the tender of the locomotive alongside it. This gives sufficient slope for the coal to slide down the chute as it is shoveled from the tender or coal car. This chute

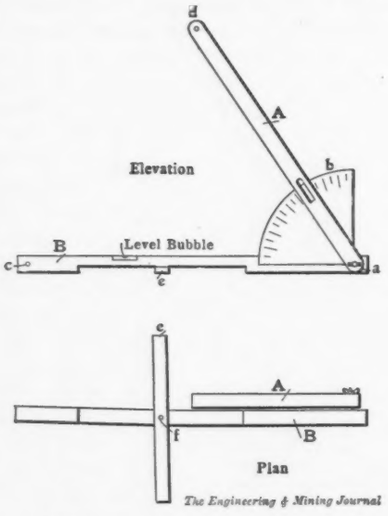


METHOD OF COALING A STEAM SHOVEL

is about 12 ft. long, 6 in. deep and 20 in. wide, lined with sheet iron. It is hoisted to a vertical position when not in use and may be used on either side. This is a recent device and is used on only four or five shovels in the district.

Device for Measuring Angles

It often happens that a transit is not at hand when it is desired to lay off the approximate angles for turning cross-drifts from a main drift. The proper



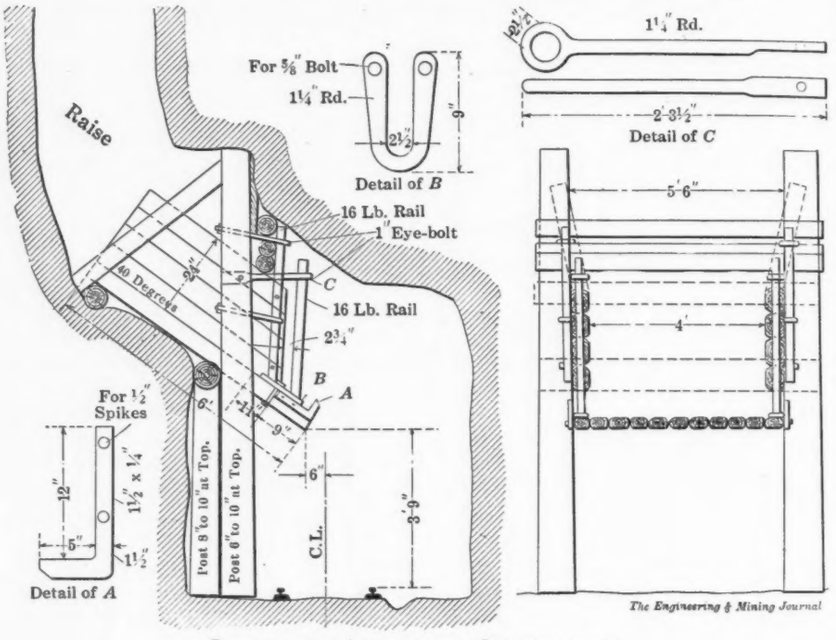
DEVICE FOR MEASURING ANGLES

angle may be approximated closely by a device invented by S. R. Elliott, of the Cleveland-Cliffs Iron Company. This consists of two pieces of wood: *A*, ½ in . x 2 in. x 3 ft., and *B*, ½ in. x 2 in. x 3 ft. 3 in., clamped together by a set screw *a*, with a quadrant of thin sheet iron between them. The angle between *A* and *B* can be read by means of the slot *b* in the piece *A*. Candles are placed in sockets at the points, *a*, *c* and *d*, for sighting. From the underside of *B*, a portion may be cut out and the piece *e* attached by a screw. This piece can be revolved at right angles, and the instrument made to stand firmly while reading vertical angles.

An Underground Ore Pocket

BY E. S. DICKINSON*

The accompanying sketch shows a type of ore pocket that is used in one of the Lake Superior iron mines. The ore is of medium hardness and stands well; the drifts are not timbered. Raises are cut from one level to another and these pockets are built at the foot. Sub-levels are driven 20 ft. below the upper level and from this sub-level underhand stoping is



DETAILS OF ORE-POCKET CONSTRUCTION

commenced in the raises. The ore is drawn from the pockets and loaded into the mine cars. When the ore has been stoped to within a short distance of the pockets or chutes, the floor and roof of the upper level is blasted down so that the ore falls into the chutes. This makes it necessary to build the pockets strong enough to stand blockholing large chunks that sometimes block the mouth of the pocket.

For pocket stopes 2-in. hemlock planks are used, these are handled by two men, one on each side of the pocket. A 1-in. maple board is used at *A* to stop the fine dirt. The bottom and sides of the pocket are built of hemlock, tamarack or spruce hewed 8 in. between the faces and cut 8 ft. long. When there is no further use for the pocket and before the level is blasted down to the level below, all timber and irons are removed to be used again. The cost of a pocket is about $30

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Removing Foreign Bodies from the Eye

When a grain of rock or a chip of steel forcibly hits the eyeball it cuts the cornea or outer coating and becomes difficult to remove. If lodged in the white of the eye, the particle if left alone will travel about and eventually work out, but in case it enters the iris, particularly near the pupil, or travels toward the pupil, it may enter through the pupil and cause loss of sight. Such cases require immediate surgical attendance, lacking which a careful attempt should be made to remove the particle. Make the eye insensitive by a few drops of 1 per cent. cocaine solution, heat the point of a needle in a smokeless flame to make sterile and when cool use to dislodge the particle from the wound. The outer coating of the eye has a gelatinous consistency, and outside of the region of the iris and pupil,, a small speck of the coating can be removed without danger. Never pry beyond the outer coating. If in the iris, it is much more dangerous to attempt removal, particularly if close to the pupil. When remote from all possible surgical attendance one is justified in making a heroic attempt at removal, for the eye, contrary to common belief, can bear considerable manipulation. A steady hand and cool nerve may often save a companion's sight.

The new shaft of the West Rand Consolidated Mines, Ltd., is inclined at 50 deg.; there are six haulage compartments to take four 6-ton and two 3-ton skips.

Utah Copper Company in 1910

According to the sixth annual report of the Utah Copper Company, during the year ended Dec. 31, 1910, the net production of copper was 85,644,511 lb., of which the sulphide mines produced 1,-142,036 lb. The net cost of producing was 8.069c. per lb. as compared with 8.787c. for the previous year. The average price received was 12.672c. as compared with 12.915c. for the previous year. The net profits for the year amounted to $5,401,775, of which sum $3,890,912 was the profit resulting from the operation of the plants in Utah. After the payment of dividends aggregating $4,648,675, together with interest on a few outstanding bonds, there remained a balance for the year of $752,912. The surplus account showed a balance of $3,083,980 and is the amount received in cash from the sale of stock in excess of the par value thereof. On Dec. 31, 1909, the issued capital stock was 734,375 shares, on Dec. 31, 1910, 1,562,599 shares, the increase being accounted for in the acquisition of the property of the Boston Consolidated Mining Company, and stock of the Nevada Consolidated Copper Company.

Copper is said to have been produced at 8.069c. and sold at 12.672c.; the Copperton mill was dismantled and remodeling of the Arthur mill begun. The reserve of fully and partially developed ore is estimated at 203,500,000 tons, containing 1.67 per cent. copper.

Ore Reserves

The underground developments on the original Utah group during the year consisted of driving 1480 ft. of tunnels, making the total underground work 181,341 ft., or 34 miles. Previous to 1910, the underground work on the Boston Consolidated group consisted of 109,876 ft. of tunnels, drifts and raises, and during the year an additional 45,567 ft. was driven, making a total of 155,443 ft., or 29 miles. The total length of all underground work done on both groups up to the end of 1910 was, therefore, 63.78 miles. A considerable portion of this underground work has been destroyed by steam shovels operating on the Utah group, and by underground mining on both groups, the total length so destroyed being 20 miles, leaving now accessible in both groups 43 miles of underground openings.

Churn drills were operated on both groups, to drill, 16 holes of a total length of 6209 ft. Previous to 1910 there had been drilled on the property seven diamond-drill holes, having a combined footage of 2609, and four churn drill holes, aggregating 1197 ft., making a total of all drilling for development purposes on the property of 10,015 ft. The cost of underground development for the year amounted to 7.02c. per ton on all ores mined and shipped to the mills. This cost was charged against operations and is included in the per-ton mining cost hereinafter stated.

The ore reserve after deducting all ores mined up to Jan. 1, 1911, is 203,500,000 tons of fully and partially developed ore. Of this amount 152,130,000 tons is fully developed and blocked. This tonnage of developed and partially developed ore includes 22,325,000 tons of ore in the slope, calculated to apply to steam-shovel workings, outside of the ore area. Of the fully developed ore 60,000,000 tons has an average copper content of 2 per cent., and the remaining 92,130,000 tons of ore fully developed contains 1.6 per cent. copper. The average assay of the partially developed ore is 1.4 per cent. copper. The entire 203,500,000 tons developed and partially developed ore contains an average of 1.67 per cent. copper.

In obtaining these averages of copper percentages, there have been used the samples from 225,722 ft. of drifts, raises, winzes and drill holes, the total number of samples taken being 27,186. As a check against the average percentages of copper stated, it is interesting to note that the average assay of the total 11,175,916 tons of ore mined and milled from the Utah and Boston groups, prior to the date of this report, was 1.64 per cent. copper. Allowing for the unavoidable admixture of waste in steam-shovel mining, the average copper content will possibly be as low as 1.6 per cent.

The average thickness of capping on that portion of the Utah group now developed is 80 ft. The best data so far obtained on the Boston group indicates that the capping is about 160 ft., although further determination may prove it to be somewhat thinner. Assuming 160 ft. as the thickness of capping on the Boston area so far developed, the average thickness for the total developed and partially developed area of both groups is 105 ft., or a ratio of approximately 3.3 tons of ore to one of capping. The total area wholly or partially stripped is 85 acres.

During the year no ore was mined by underground methods from the original Utah Copper group, but underground mining operations of the Boston mines were continued throughout the period. Of the total ore mined during the year 82 per cent. was mined by steam shovels from the Utah mine, and 18 per cent. by underground methods from the Boston mine. The average cost of mining for the year was 40.97c. per ton, of which 13.3c. was to cover development and stripping expense, leaving a total cost for producing ore of 27.67c. per ton. The total cost of producing the 20 per cent. of underground ore was approximately the same as the total cost of producing the other 80 per cent. by steam-shovel methods.

During the year eight steam shovels, 12 standard-gage locomotives, and 80 twelve-yard all-steel dump cars were purchased. These, together with the equipment acquired with the Boston Consolidated property, bring the totals to 22 steam shovels, 34 standard-gage locomotives, 11 narrow-gage locomotives, 80 standard-gage 12-yard dump cars, 118 standard-gage six-yard dump cars, and 146 narrow-gage four-yard dump cars. Of the 22 steam shovels two are obsolete in design, and are only used in emergencies. The stripping, ore and service tracks over and about the mines comprise 25.2 miles of standard-gage track, 5.16 miles of narrow-gage track, and 2.26 miles of three-rail track, a total of 32.62 miles of track.

Milling Operations

The Magna plant was operated continuously throughout the year. The Copperton plant was permanently closed on August 1, and has been dismantled, the machinery being taken to the Arthur plant to be used in remodeling it. Portions of the Arthur plant were operated intermittently during the year, as the tonnage produced was in excess of the Magna plant's existing capacity. On November 1 three of the 13 sections of the Arthur plant were permanently closed and partially dismantled, for the purpose of remodeling them along the lines of design, and for the methods of operation employed at the Magna plant. Shortly after the acquisition of the Arthur plant from the Boston Consolidated company it was determined to turn the operation of both the Magna and the Arthur plants over to independent engineers, who conducted an exhaustive examination into the methods employed at both plants. They had charge of the operations during a period of one month and both plants were operated on precisely the same grade and the same character of ore. This comparison showed much better extraction and lower cost at the Magna plant.

At present one of the remodeled sections of the Arthur mill had been started, and is showing an efficiency in all points fully equal to that of the Magna mill and four other sections are in advance pro-

cess of reconstruction. When remodeling of the Arthur plant is completed, it will have a capacity of approximately 8000 tons per day, as compared with 3000 tons for the old plant. This increase is being made with only slight extensions to the original building. During the year the Magna plant has undergone substantial improvement both as to arrangement and methods of operation, and its capacity has been increased to more than 10,000 tons per day, and, at the same time, its metallurgical results have been improved.

Costs of Mining and Milling

The total tonnage treated at all plants for the year was 4,340,245 tons, of which the Magna plant milled 3,209,984 tons, the Arthur plant 936,900 tons, and the Copperton plant 193,361 tons. The average grade of the ore treated at all plants was 1.54 per cent. copper; the average extraction at all plants 66.55 per cent., equivalent to a recovery of 20.51 lb. of copper per ton of ore. The average extraction at the Magna plant, on the grade of ore stated, was 67.3 per cent., and that of the Arthur plant, on the same grade of ore, 64.41 per cent. The improvements in the Magna plant have resulted in a gradual betterment in its metallurgical results, until at the close of the year it was making an extraction of 70 per cent. on this grade of ore.

The average cost of milling for all plants for the year was 46.63c. per ton. The average cost of milling at the Magna plant was 43.76c. per ton, and that at the Arthur plant 51.34c. per ton, these milling costs including their proper proportions of all fixed and general charges. The average grade of the concentrates produced was 27.28 per cent. copper. The average total cost of mining and milling, exclusive of transportation charges was 87.6c., as compared with 94.43c. for the previous year. Included in this cost is the charge previously referred to, under the discussion of mining, of 13.3c. per ton, covering all underground developments, cost at the mine, and proper proportion of stripping expense.

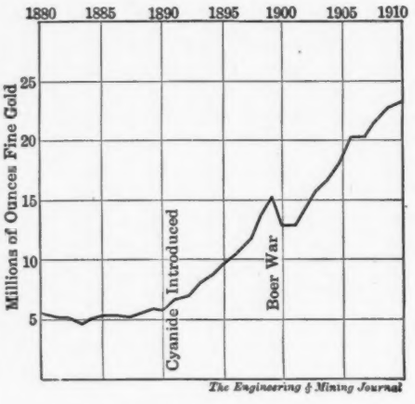
New Electrolyte for Lead Refining

The Siemens & Halske company has lately patented the use of a new electrolyte for lead refining (French Pat. 419,769; German Pat. 223,668, k. 40c., g. 12). This electrolyte consists of a solution of lead perchlorate, containing free perchloric acid, and a colloid of some sort, glue, gelatin, etc., to prevent the lead from coming down in crystalline form. The advantage of such an electrolyte is supposed to consist in its higher conductivity, and the fact that it does not decompose on heating, as does the hydrofluosilicic acid of the Betts process.

The Cyanide Industry

By William Neill*

The world's output of gold in 1910 was, approximately 23,000,000 fine ounces, about 25 per cent. of which was recovered by cyanide. The indirect value of the process may be measured from the fact that the cyanide bullion produced on the Rand in 1910 was equal to the profit earned by the mines, the figures being: Yield from cyaniding, £11,552,743; total working profit, £11,567,099. Conversely, without cyanide the Transvaal gold-mining industry would not be a profitable one, and this would also apply to the principal mines with cyanide annexes in Australasia and the American continent. The gold curve since 1891—the year in which the cyanide process was introduced—pays tribute to the inventors of the process, to the able band of British and American metallurgists and engineers who developed it and to their successors who year by year bring the most com-



World's Gold Output

plex ores to the cyanide vat and excavate for retreatment abandoned residues.

Fall of Cyanide Prices

In this development the industry has been supported by engineering firms who specialize in mining plant and machinery, it has also received the support of cyanide manufacturers, and indeed the progress made in the manufacture of cyanide during the last 20 years is coördinate with the progress made in its application. Research chemists and chemical engineers in this field have solved many problems—and have failed to solve as many more. The expenditure on research and experimental work, on factories successful and unsuccessful for the manufacture of cyanide, cannot be less than $8,000,000. This covers Britain, America, and the Continent, in the period since 1891. In that year the price of cyanide was about 48c. per lb. on a 100 per cent. basis; today the price is 14c. f.o.b. European ports. The fall was gradual and reflected the advent of new processes and reduced manufacturing costs. The following are f.o.b. London prices and indicate the tendency: 1894, 40c.; 1895, 30c.; 1896, 24c.; 1897 to 1901, 20 to 22c.; 1902, 19c. per lb. Toward the end of 1903 the market found its level at 14c., several producers going under.

Concurrent with the reduction in price the standard of quality increased. Calling to mind the commercial cyanide of 18 years ago, a dirty gray in color with 20 per cent. of insoluble matter and 5 per cent. of cyanates, manufacturers who have lived through the period are more inclined to regret the errors of the past than to glory in present attainment. It will serve no useful purpose, however, to consider methods of manufacture which are long since dead and buried, or processes which have had an untimely end, or ideas which have not yet fructified. The mining community is concerned with present supply. The commercial cyanides of today have sodium as a base and are supplied in three grades containing cyanide equal to: (1) 98 to 100 per cent. KCN; (2) 120 per cent. KCN; (3) 128 to 130 per cent. KCN. The demand for the first is gradually diminishing, consumers recognizing the economy involved in the transit of the higher grades. The first and third are produced in Britain, in America, and on the Continent, and are fused. The second (120 per cent.) is a product of the Continent alone, and being obtained by a wet process is finished by compression in the form of small briquets. The principal producers of fused cyanides work on lines laid down in Castner's patents; using metallic sodium as the base and ammonia as the source of nitrogen. An important quantity of high-grade fused cyanide is also produced, chiefly in Britain, through the medium of ferrocyanide and metallic sodium. The briquetted cyanide is a by-product of the beet-sugar refinery. The residue (*schlempe*) of the sugar, when heated, gives off a gas rich in ammonia and hydrocyanic acid. The former is collected as sulphate and the latter through caustic soda as cyanide of sodium.

Production Now Exceeds Demand

While the producers of cyanide from *schlempe* and ferrocyanide are dependent for their supply of cyanogen upon the sugar refineries and the gas works, the synthetic makers have at their command unlimited quantities of raw material. At no time in the history of the industry has there been any shortage in the supply of cyanide: local scarcity excepted. The production during the last five years has far exceeded the consumption, and the chief producers today are running on decreased outputs. This is due on the one hand to the great development which has taken place in the treatment of the beet-sugar residues on the continent, and on the other hand to a world-wide economy in the consumption

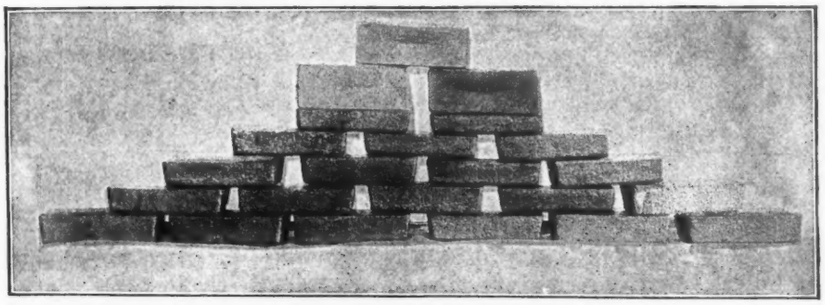
*Manager and secretary, the Cassel Cyanide Company, Ltd., Glasgow, Scotland.

of cyanide, fine grinding of the ore being largely responsible for this economy. The tonnage milled on the Rand in 1910 was almost double that of 1905, while the cyanide consumed showed an increase of barely 50 per cent. Apart from its application to the treatment of gold and silver ores the market for cyanide is unimportant. A few hundred tons will cover the requirements of the electroplaters, and of the fruit growers who use it as an insecticide. These consumers prefer 98 per cent. potassium cyanide (single salt) despite its higher price. This product is still manufactured on the Continent, and to a lesser extent in Britain.

A Large Shipment of Gold

The accompanying illustration is from a photograph of a recent shipment of gold bullion made by the Goldfield Consolidated Mines Company. This bullion was produced by two weeks' milling.

The shipment comprised 23 bars and weighed 2138 lb. The average weight of the bars was 1350 oz. Troy, and the average volume of each 148 cu.in., or a little less than the equivalent of two and a half ordinary building bricks.



TWO WEEKS' PRODUCTION AT GOLDFIELD CONSOLIDATED MILL—2138 LB. OF BULLION

Tonopah Report

In the ninth annual report of the Tonopah Mining Company of Nevada for the year ended Feb. 28, 1911, it is stated that J. E. Spurr was employed during the last year to make a geological examination of the mine and together with the mine superintendent outlined a scheme for development work.

During the year 177,745 tons of ore averaging 0.32 oz. gold and 28.65 oz. silver were milled for a return of $20.16 per ton. The average price for silver was 53.665c. The recovery by concentration was 13.27 per cent. of the gold and 21.53 per cent. of the silver; by cyanidation 76.86 per cent. of the gold and 70.87 per cent. of the silver, a total recovery of 90.13, and 92.40 per cent. of the respective metals.

The average mining cost for the year was $3.954; the milling cost $3.177. Other expenses brought the total of costs to $8.25 per ton. During the year five Woodbury concentrators were replaced by four Wilfley tables. An appropriation will be asked for to replace the Huntington by chilean mills.

During the year, 2733 ft. of development work was done, making the total footage of drifts, crosscuts, winzes and shafts, 118,000 ft. Core drilling to the extent of 2978 ft. was done. The ore reserve is estimated at 354,940 tons worth $6,605,978. Dividends amounting to $1,550,000 were paid during the year.

American Institute of Mining Engineers

As already announced, the one-hundredth meeting of the Institute will be held in the Pennsylvania anthracite region, where the institute was first organized at the Wilkes-Barre meeting of May, 1871. Headquarters will be at the Glen Summit Springs Hotel, near Wilkes-Barre. The meeting will open on the evening of June 6, and will continue until June 9; one extra day, June 10, will be devoted to visiting the underground workings of several mines. The program includes, besides the regular sessions, visits to mines, breakers and coal-storage plants; also to Lehigh University and the Bethlehem Steel Works.

W. A. Lathrop is chairman and R. V. Norris, Wilkes-Barre, is secretary of the executive committee in charge of the arrangements.

The following papers are announced for this meeting:

1. "Geology of the Cobalt District, Ontario, Canada." By Reginald E. Hore, Houghton, Mich.
2. "Origin of Certain Bonanza Silver Ores of the Arid Region." By Charles R. Keyes, Des Moines, Iowa.
4. "A Drafting Table for Tracing through Opaque Paper." By A. T. Schwennesen, Stanford University, Cal.
5. "Lead Smelting on the Ore Hearth." By J. J. Brown, Jr., Wilburton, Okla.
6. "Proposed Code of Rules for the Installation and Use of Electricity in Mines." By S. A. Taylor, Pittsburg.
7. "The Caddo Oil and Gasfield, Louisiana." By Walter E. Hopper, Madison, Wis.
8. "Origin of Iron Ores of Central and Northeastern Cuba." By C. K. Leith and W. J. Mead, Madison, Wis.
9. "Occurrence, Origin and Character of the Surficial Iron Ores of Camaguey and Oriente Provinces, Cuba." By Arthur C. Spencer, Washington.
10. "The Mayari and Moa Iron-Ore Deposits in Cuba." By C. Willard Hayes, Washington.
11. "Exploration of Cuban Iron-Ore Deposits." By Dwight E. Woodbridge, Duluth, Minn.
12. "The Iron-Ore Deposits of the Moa District, Oriente Province, Island of Cuba." By Jennings S. Cox, Jr., Santiago de Cuba, Cuba.
13. "Characteristics and Origin of the Brown Iron Ores of Camaguey and Moa, Cuba." By Benjamin L. Miller and Willard L. Cummings, Bethlehem, Penn.
14. "The Application of the Equation of the Straight Line to the Reduction of Triangulation Readings." By L. D. Moore, Holden, W. Va.
15. "The Fuel Efficiency of the Iron Blast Furnace." By John Jermain Porter, Cincinnati, Ohio.
16. "The Continuous System of Cyaniding in Pachuca Tanks." By Huntington Adams, Ixtlan de Juarez, Oaxaca, Mexico.
17. "Mining Costs at Park City, Utah." By Fred T. Williams, Park City.
18. "Some Radical Improvements in the Practice of Concentrating Minerals by the Use of Wet Tables." By S. Arthur Krom, Plainfield, N. J.
19. " Electrical Practice in Mines." By Burton McCullom, Washington.
20. "The Bituminous-Coal Industry." By S. K. Smith, Vintondale, Penn.
21. "History and Geology of Ancient Goldfields in Turkey." By Leon Dominian, New York.
22. "Tunnel Driving in the Alps." By W. L. Saunders, New York.
23. "Briquetting Plant of the Lehigh Coal and Navigation Company." By Charles Dorrance, Jr., Lansford, Penn.
24. "Canadian Mining Law." By J. M. Clark, Toronto, Canada.
25. "The Liberty Bell Mine." By Charles A. Chase, Denver, Colo.
26. "The Storage of Anthracite Coal." By R. V. Norris, Wilkes-Barre, Penn.
27. "Anthracite Preparation." By Paul Sterling, Wilkes-Barre, Penn.
28. "Loss in 'Breaking Down' Anthracite." By W. F. Dodge, Scranton, Penn.
29. "The Summit Hill Mine Fire." By W. A. Lathrop, Philadelphia.
30. "The Anthracite Arbitration Board." By S. D Warriner, Wilkes-Barre.
31. "Reminiscences of the Beginning of the Institute." By R. W. Raymond, New York.
32. Discussion of paper of W. H. Emmons, "Agency of Manganese in the Superficial Alteration and Secondary Enrichment of Gold Deposits in the United

States." By Charles R. Keyes, Des Moines, Iowa.

33. Discussion of paper of William Wraith, "Sampling of Anode Copper, with Special Reference to Silver Content." By Edward Keller, Perth Amboy, New Jersey.

British Iron and Steel Institute

The following is a list of the papers that are expected to be submitted at the annual meeting of Iron and Steel Institute this month:

1. "On Temperature Influences on Carbon and Iron." By E. Adamson, Sheffield.

2. "On the Chemical and Mechanical Relations of Iron, Chromium and Carbon." By J. O. Arnold, Sheffield, and A. A. Read, Cardiff.

3. "On the Growth of Cast Irons after Repeated Heatings," Parts ii, iii, and iv. By H. C. H. Carpenter, Manchester.

4. "On the Relation of Impurities to the Corrosion of Iron." By John W. Cobb, Leeds.

5. "On Magnetic Properties of some Nickel Steels with some notes on the Structures of Meteoric Iron." By E. Colver Glauert and S. Hilpert, Berlin.

6. "Note on a Process for the Desiccation of Air by Calcium Chloride." By Félix A. Daubinè and Eugène V. Roy, Auboué, France.

7. "On the Volumetric Estimation of Sulphur in Iron and Steel." By T. Gifford Elliot, Sheffield.

8. "On the Action of Aqueous Solutions of single and mixed Electrolytes on Iron." By J. Newton Friend, and Joseph H. Brown, Darlington.

9. "On Iron-Silicon-Carbon Alloys." By W. Gontermann, Siegen, Westphalia.

10. "On the Influence of Vanadium upon Cast Iron." By W. H. Hatfield, Sheffield.

11. "On the Organic Origin of the Sedimentary Ores of Iron." By W. H. Herdsman, Glasgow.

12. "On Some Studies on Welds." By E. F. Law, W. H. Merrett, and W. Pollard Digby, London.

13. "On the Corrosion of Steel." By Percy Longmuir, Sheffield.

14. "On the Influence of 2 per cent. of Vanadium on Steels of varying Carbon Content." By A. McWilliam, and E. J. Barnes, Sheffield.

15. "On some properties of Heat-treated 3 per cent. Nickel Steels." By A. McWilliam, and E. J. Barnes, Sheffield.

16. "On Mechanicalising Analysis as an aid to Accuracy and Speed for Commercial Purposes." By C. H. Ridsdale and N. D. Ridsdale, Middlesbrough.

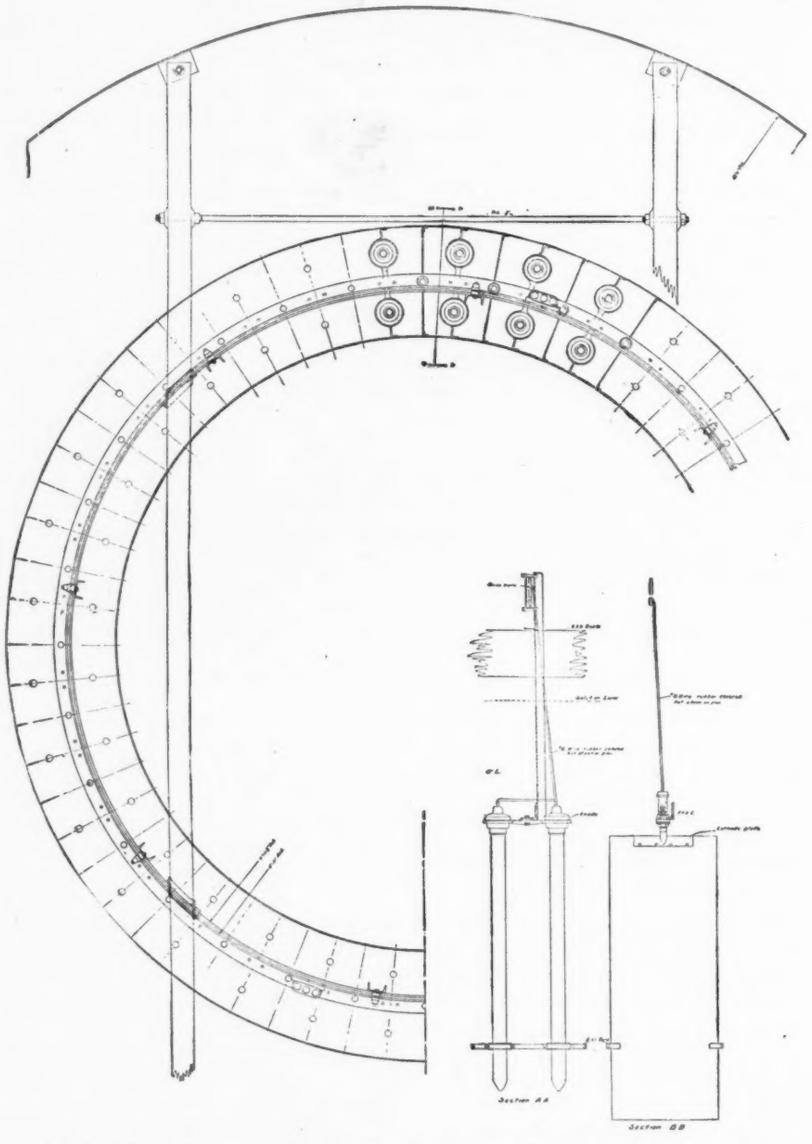
17. "On Welding up of Blowholes and Cavities in Steel Ingots." By J. E. Stead, Middlesbrough.

The Application of the Clancy Cyanide Process

The chemistry of the Clancy cyanide process has been exhaustively reviewed in the technical press, and it is the purpose of this article to give a brief presentation of the practical application of this process as now being installed at one of the Cripple Creek mills. It may be mentioned in passing that the Clancy process is conducted in two stages: (1) The generation of a halogen-cyanogen compound, in practice, cyanogen iodide, which attacks the sulpho-telluride minerals dissolving them with the gold: (2) the regeneration of the cyanide through the reaction between the calcium cyanamide and the sulpho-cyanides and alkaline cyanates.

The apparatus necessary for the Clancy process is simple. It comprises, besides the usual fine-grinding and cyaniding equipment, a low-voltage direct-current generator, a cyanamide solution tank, and an electrolyzing apparatus which is hung in the Pachuca, or other agitating tanks that may be in use.

The cyanamide, of which 56 to 60 per cent. is soluble, is dissolved in a separate work-solution tank, and the filtered or clarified solution is fed into the tube mill, or at any other convenient part of the circuit, preceding the agitating tanks.



CLANCY ELECTROLYZING APPARATUS SUSPENDED IN 18-FT. AGITATING TANK

The electrolyzing apparatus is suspended from a frame and hangs about 2 ft. below the surface of the liquid in the agitating tank. It comprises essentially a circular beam, from which are hung the anodes and cathodes, with suitable electric connections. The accompanying illustration shows an installation of the electrolyzing apparatus in an 18-ft. tank, the anodes and cathodes being hung from a 10-ft. ring. The anodes are hung in pairs between each cathode sheet.

The anodes consist of fused magnetite, which is sufficiently hard to prevent wear by attrition of the pulp. It may be mentioned in this connection that Mr. Clancy reports having tried graphite anodes, but abandoned them on account of the attrition and the disadvantage of having the fine particles of carbon distributed through the solution, with the tendency to precipitate the gold. Each anode is 46 in. long, is cylindrical in form, and copper-plated on the inside for the purpose of increasing the conductivity. The surface area of each anode is 2.2 sq.ft. It is closed at the lower end, and the upper end is cemented into a porcelain cap, which insulates the anodes from the frame and protects the copper connections from the solution. The top of the porcelain cap is filled with a waterproofing compound, and the copper leads are incased in a similar solution-proof covering.

The cathode is an iron plate, 18 in. wide by 48 in. long, and 3/32 of an inch thick. It is insulated in a manner similar to that of the anodes. The current density varies, about 18 amp. per sq.ft. of anode surface being usually employed. The difference of potential between the electrodes is about seven volts and a current of approximately 50 amp. is passed through each anode.

General Procedure

It should be borne in mind that the Clancy process differs from most electrolytic processes in that the electricity is not used for the precipitation of the metals, but for the manufacture or regeneration of the necessary chemicals. During the first stage of the process the electric current is used to generate constantly in the pulp the cyanogen iodide, thus maintaining the solution at the best possible strength. At this stage the alkalinity of the pulp must be kept as low as possible and agitation is continued for about eight hours in the Pachuca or other agitating tanks. It is during this period that the extraction of gold from the sulpho-telluride minerals really occurs, but the oxidation means employed destroys active cyanide so that a second period of electrolyzing, extending over four or five hours, is required for regenerating the cyanides from the sulpho-cyanides and cyanates developed during the first stage of the process. At the beginning of the second stage the solution is made more alkaline by the addition of lime up to 0.5 or 0.6 lb. CaO per ton of solution. On the completion of the second period of electrolyzing the pulp is passed to the filtering apparatus, and thence to the zinc boxes in the usual manner.

The reason for conducting the process in two stages is that the cyanogen iodide is not stable in the presence of strong alkali. During the second stage, however, the alkalinity of the solution must be increased in order that the reaction between the calcium cyanamide and the sulpho-cyanides and cyanates may proceed. The excess alkalinity from this stage of the process is reduced when the solution meets the next batch of ore; further lime is usually necessary to neutralize the acidity of the ore. Crude iodine is used as the source of the iodide, which does not require replenishing except for the mechanical loss. This it is estimated will amount to about 2c. per ton.

An installation substantially as described above is now being made by the Moore Filter Company in the new Ajax mill near Victor, Colo. This mill should be completed in June, and the results of the process in actual practice will be watched with interest by all metallurgists.

Ray Consolidated Interim Report

At the annual meeting of the Ray Consolidated Copper Company, held Sept. 27, 1910, the date of the annual meeting was changed to the third Friday in April of each year, and the fiscal year was changed to correspond with the calendar year. As a result of the offer of the Ray company to exchange its shares for stock of the Gila Copper Company on the basis of exchange of three shares of Gila for one share of Ray stock, all but about 3000 of a total of 605,000 shares of the Gila company were acquired.

Developments and Reserves

Drilling for development alone was entirely discontinued in the month of November, 1910, after having developed approximately 2,500,000 tons of ore in addition to that mentioned in the last annual report. The totally developed and partially developed ore is now 77,535,000 tons. Of this quantity 64,831,000 is classed as developed, and the remainder as partially developed. The developed ore includes only those areas which have been systematically and fully drilled in 200-ft. squares. The partially developed class is represented by areas that have not been completely drilled in 200-ft. squares, but where in some instances the drill holes connected and used in tonnage calculation are as much as 400 ft. apart. The average copper content of the developed and partially developed ore is reported the same as that given in the last annual report; viz., 2.17 per cent.

The total length of underground workings existing on April 1 was 88,651 ft., or about 16¾ miles, representing an increase of approximately 100 per cent., as compared to the underground work completed prior to the publication of the last annual report. Underground workings are now being extended at the rate of 1½ miles per month. No extensive stoping was done up to the first of April, but there has been produced during the last year approximately 123,000 tons of ore almost entirely from development workings, including the preparation of a few stopes for actual mining. This tonnage makes a total of 186,000 tons of ore produced during development. Of this 154,000 tons was put on the stock pile at the mines, and 32,000 tons shipped to the mill at Hayden.

Progress at the Mill

One of the eight sections of the mill was finished on March 10 and was put into commission on March 15. Five days later it was given a regular feed of ore, and barring short periods of suspension for adjustment, has been running continuously ever since. This section is now treating 800 tons in 24 hours—all that the mine is prepared to furnish until the permanent equipment of shaft No. 1 goes into commission about the middle of April. The section has not yet been running long enough to permit of final adjustment, or to give metallurgical results of a thoroughly definite and dependable character, but the results so far obtained, the report states, indicate extractions fully up to expectation; viz., about 70 per cent. on an ore containing 2.2 per cent. copper, which is the grade now being milled and approximately the average grade for the property. Shipment of concentrate to the El Paso smeltery has been commenced, and will continue until the company's smeltery is ready for operation.

A second section of the mill will be started about May 1, and after that date one section will be started each month up to Sept. 1. After that time longer intervals will probably prevail between the starting of additional sections, as it is not expected that the mine will be able to provide sufficient tonnage to operate the entire plant to capacity until after the end of the year. The behavior of the first section, now in operation, indicates that the mill will be able to handle about 8000 tons per day.

Construction of the Smeltery

The structural steel for the smeltery is about ready for shipment, and the machinery is in process of manufacture, delivery of a considerable part of it having already been made. The grading is about complete, and the necessary foundation work is light; while the mill buildings will be completed in July, it is not expected that the smelting plant will be ready to operate until late in September or early in October. The water supply developed by sinking large shallow wells in the gravel of the Gila River valley has proved entirely satisfactory and abundant. The power-transmission line from the Hayden power plant to the mines was completed in March, and the entire power requirement at the mines will be supplied through it as soon as the permanent mining equipment is put into commission.

Mining Around Telluride and Ouray, Colo.

By Warren C. Prosser

Judging from present plans and arrangements being made, prospecting will be carried on in every section of San Juan county, but the principal fields of exploitation will be, the eastern range for free gold in argentite ores; Bear creek for telluride ores; and a large area from South Mineral creek to the La Plata for limestone deposits.

In the Telluride camp of the San Miguel section, the Liberty Bell, Tom Boy and Smuggler mines will continue about the same in production during the present year. The Liberty Bell has perfected the mill until it now has an extraction of over 90 per cent., and this from a rather complicated, ever-changing ore. It has probably a longer prospective life than any other mine in the district, as it has several years' run blocked out. W. H. Staver is superintendent, Charles A. Chase, consulting engineer. The Smuggler Union is working largely on the leasing system. The company owns two mills at Pandora, which are divided into units according to the number of leasers. The Tomboy will keep 60 stamps dropping regularly, at the mill in Savage basin.

With the steady production of these three mines and other operations apparent, this year will probably see an increase in the number of men employed and the amount of bullion and concentrates shipped.

The Black Bear mine is working 20 men and is forcing operations toward a producing stage. It has a mill and tramway to the railway. The Junta company plans building a two-mile tramway from the property in La Junta basin to a mill site in Bear creek gulch. The Alta in Gold King basin is shipping one car of concentrates regularly per day. It is installing an additional 10 stamps. A two-mile tramway connects with Ophir. The Suffolk property at Ophir, under the management of George B. Pickett, has had a force at work all winter on development and expects to begin operations soon. The mill is in the town of Ophir and is connected to the mine by tramway. The Modern Gold of Ophir Company has been developing during the winter and is reported to be ready to ship. The Lewis in Bridal Veil basin has been active all winter. Their mill erected last year will be put in operation in the near future. The Mountain Flower group on Deep creek has had a force of men driving a crosscut during the winter. It has not yet reached the vein driven for but has cut a blind lead which is promising.

In the La Plata mountain section the litigation between the Idaho and the May Day is not yet settled. This suit is being fought out over apex rights. The May Day has built a shaft house and has installed a hoist and compressor and is sinking a shaft on its ground with the expectancy of going down vertically into the workings of the Idaho. In the meantime the Idaho is temporarily closed down. When these difficulties are settled work will be resumed. Leasers on the Van Emmet group are operating in formations and conditions similar to those on the Idaho. Resumption of operations on the Delayed property is announced. It is reported that the ore has been tested successfully and that one of the important adjuncts to the property will be the erection of a large mill in the Animas valley at Hermosa, connected to the property by tramway.

At Ouray, the Camp Bird mine is reported to have struck a large new vein. New impetus is expected to be given to the operation of the mine through this discovery. The Revenue tunnel continues active with a large force and will probably operate steadily during the year. Developments are reported active on the Atlas, Barstow, Micky Breen, Yankee Girl, Legal Tender and Lundberg leases.

At Rico, the United Rico Mines Company, M. Godet in charge, has reorganized and is expecting to spend between $150,000 and $250,000 in placing this group, in conjunction with the Pro-patria and others, on an operating basis.

In the whole district the new features developing are the treatment of zinc ores and the introduction of the cyanide process in the Silverton section, the developing of the rich ores of the La Platas, and the exploitation and development of the new vanadium and uranium deposits of the Telluride section.

The Gold Springs District

Salt Lake Correspondence

A fair amount of activity is promised this season in the Gold Springs district, which extends from Iron county, Utah, across the boundary line into the western part of Lincoln county, Nevada, about 15 miles northwest of Modena. This district includes the camps of Gold Springs and Fay, with Stateline a short distance to the north. The ore occurs in fissure veins in andesite and porphyry, and in many cases can be traced on the surface for some distance. The vein filling is white quartz, which carries up to $10 in gold and silver per ton, though there are places where higher grade shoots have been encountered.

The Gold Springs Mining and Power Company has done the greatest amount of development in the district at its Jennie mine and has recently installed a mill with 12 Nissen stamps and a cyanide plant of 100 tons capacity, also a compressor and electric hoist. The Jennie vein has been opened to 300 ft. A merger of this company with the Gold Springs Consolidated is being arranged which will give a much larger territory and tonnage. It is figured this can be handled to advantage by the present mill, which is run by power from the producer-gas electric plant, at Modena. There is estimated to be a large tonnage, which will net $2 a ton above a depth of 400 ft. C. A. Short, H. R. Elliot and A. I. Martin, of Salt Lake City, hold the controlling interest.

The Utah-Stateline Mining Company and the Wild Irish Gold Mining Company, in which Los Angeles people are interested, have not been under development for some time, but will resume work with the cheaper electric power now available.

At the Bull Hill property, the tunnel, which is being driven to cut a large vein at a depth of 600 ft., has still about 50 ft. to go. This should be reached in May. Several smaller veins carrying calcite with some fluorspar have been cut, which yield free gold on panning. The property is not far from the old Horseshoe mine. Ernest Lane, is manager.

At the White Horse mine, Messrs. Miller and Rafferty are reported to have opened a 12-ft. vein at the bottom of the 80-ft. shaft near Fay. High assays in silver and gold have been obtained in places.

About a car of silver-gold ore has been mined by Tom Beck and William Brown from the E & C mine. There is a 240-ft. incline on the vein, which exposes an 8-in. streak of high-grade ore along the footwall. A shipment will be made shortly.

Mining in Aguascalientes

The Leonora mines, in Juchipila, Aguascalientes, belonging to Daniels & Sons, have been closed since the first visit of the revolutionists to that place. At Asientos, work has been suspended at the Purisima mine, Mr. Rapp has closed down the Alta Palmira mine, and the Towne interests have stopped shipping from the Lead's Queen mines, although the latter has a large body of good ore developed. Mr. MacAllep, superintendent of the last-named mines, has resigned and will remove to Oregon. The Santa Francisca mines continue shipping as well as the mines at Tepezalá, and are the main support of the smeltery at Aguascalientes, at which plant six furnaces are in operation at the present time. The Nopensada properties are being worked by S. Rapp, under lease, and are shipping to Aguascalientes. The Socorro mine, Gabriel Chavez, owner, is also shipping steadily to Aguascalientes.

As there is no railroad traffic north of Zacatecas the Aguascalientes smeltery is depending on the ores from Asientos and Tepezalá, and what other ores they may receive from the south and over the San Luís Potosí branch line.

Mining and Milling at Trinity Mine

By J. W. Swaren*

The overburden on an inclined sheet of ore, at this California property, is removed by hydraulicking; the ore is mined from gloryholes and opencuts, crushed by stamps and the gold recovered by cyanidation.

*Shawmut building, San Francisco, Cal.

The Trinity gold mine is on the eastern bank of the Trinity river, in Trinity county, California, and 32 miles northwest of Delta, a station on the Portland division of the Southern Pacific railroad, with which the mine is connected by a toll road. The mine is situated in rugged country, covered by a growth of good timber, in a range of the Salmon mountains, some of the peaks of which are 6000 ft. above sea level. The property, comprising 423 acres of land, 3½ miles of ditch, supplying water under a head of 700 ft. at the mine, and a hydroelectric power plant on Coffee creek, is now owned and operated by the Trinity Gold Mining and Reduction Company.

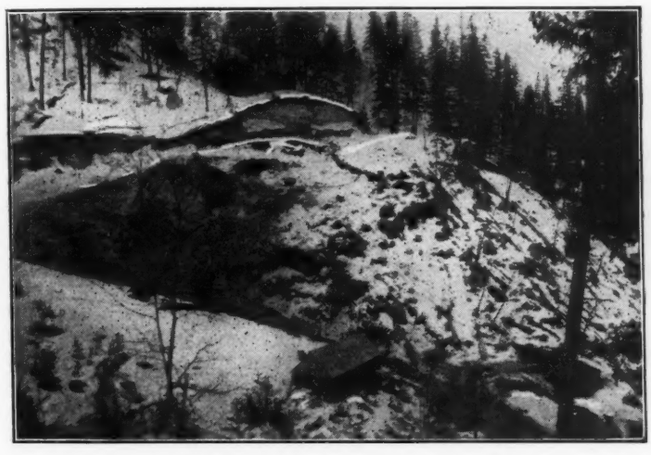
Early Developments

The discovery and location of the gossan outcrop was made nearly 15 years ago. Subsequent developments have shown that the orebody, covered by about 25 ft. of overburden, lies in an irregular sheet on the side of a hill, outcropping at the lower edge. The first company that attempted to work the deposit, drove tunnels into the side of the hill below the outcrops, expecting to cut the orebody at depth. Naturally these operations were doomed to failure and each succeeding company merely selected a new site for a tunnel or enlarged on one of the earlier attempts. The last last company endeavoring to work this property, before the present owners obtained it, installed a 5-ft. Huntington mill and a small cyanide plant with five sand vats. An opencut was started at the outcrop and enough ore was mined, in addition to that taken from the tunnels, to supply the mill.

The first used method of cyanide treatment was not successful, as an attempt was made to leach a mill product that was approximately half slime. This equipment had been in service several months when the cyanide plant was destroyed by fire, just after the regular monthly cleanup. As the mine had never paid any returns to its owners, dissension arose among the stockholders, followed by litigation and the property lay idle eight years or until the present owners became interested.

During the summer of 1909 an extensive sampling campaign was conducted to determine the size and average value of the orebody and a suitable method of ore treatment. Hydraulic giants, using water from the upper ditch under 400-ft. head, were employed to strip the overburden in order to expose the orebody. Samples were taken frequently as the work progressed and assays were made on the ground. This work commenced in March and continued until June 28, when water began to run short. The remainder of the year was spent in driving raises from the old tunnels, through the orebody to the surface. Two separate shipments of ore from all parts of the deposit were sent to San Francisco, where tests were made that showed, when sand and slime were properly separated, that 90 per cent. of the gold could be economically recovered by cyanide treatment.

From the tests and assays, a method of treatment was evolved and a reduction plant designed and built. Since operations have begun, the results obtained in actual work have checked with the test results. The advantages and economies presented by the continuous system of slime filtration led to the adoption of that method of treatment. No gold is recovered by amalgamation as there is no free gold in the ore. In order to take advantage of the extreme agitation in the mortar the ore is crushed in cyanide solution. Hydraulic classification was adopted and the usual downward leaching of sand in vats. A system of continuous thickening, before agitation by compresed air, followed by a second thickening before filtration, was adopted for the treatment of the slime. Every possible operation was made automatic. The labor required for operation is small; one man on the battery floor and two men in the cyanide plant constitute a shift. The selection of the continuous system of treatment has been justified, not only by the high extraction now being obtained in the mill, but also by the reduction in the first cost of the plant and subsequent labor economies it has been possible to make.



Stripped Area of Trinity Orebody

Gloryholes in Stripped Area

The Orebody

The orebody uncovered by the stripping operation lies in a sheet, strikes almost due north and dips at 25 deg. to the west. The entire region has been step-faulted and the outcrop first discovered was at the southwest corner of the orebody now being worked. Along its southern edge, the deposit is nearly 40 ft. thick, while where it enters the hill on the northern part of the stripped area, it is over 80 ft. thick. Where it enters the hill on its eastern edge, the thickness is not known, as the overburden has been stripped farther than any of the tunnels

has penetrated. An area of over three acres has been stripped and enough ore is blocked out to supply the 200-ton, 40-stamp mill for six years.

The ore is oxidized, soft and friable. Occasional masses of sulphides are encountered, together with small intrusions of porphyry. These constitute practically the entire waste broken and make an extremely small percentage of the total output. When mining was started the ore assayed $5.27 gold and one ounce silver with a trace of copper, but at present the gold content is $5.50 per ton. Pockets of greater richness are occasionally opened, sometimes running $12 per ton. These pockets are secondary enrichments in some instances but more often are points of intense deposition.

When crushed to 30 mesh, the ore makes 55 per cent. slime and 45 per cent. sand, more than half the gold being in the slime. When stripping was stopped, it was found that the hard, solid mass of ore exposed rapidly weathered so that it crumbled readily and could be easily mined.

Mining Methods

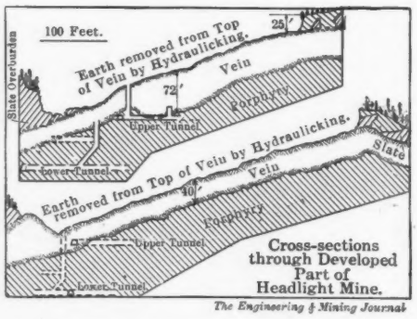
Raises have been opened to the surface from the tunnels driven in earlier workings. These raises have been broken out in gloryholes and the greater part of the ore is now mined in this way. The ore is too soft for drilling with piston drills so air hammers are used. About ½ lb. of 40 per cent. dynamite per ton of ore is consumed, small charges being used. After blasting, the loosened ore is barred from the sides of the gloryhole. In some parts of the orebody it is not even necessary to blast, the ore being so soft that it can be loosened with bars and picks. Logs are put across the bottom of the gloryholes, forming grizzlies with 14-in. openings.

In addition to the gloryholes one raise, that has not been opened to the surface, is being used as a basis for shrinkage stoping while at the opposite end of the deposit an opencut is being worked. The stope and opencuts are intended to supply the mill when the weather or accident interferes with work in the gloryhole; the snowfall is quite heavy and it is important to provide against weather interruption to the supply of ore. Practically all rock broken is sent to the mill, occasional masses of sulphide ore are stacked, the porphyry intrusion being the only part sent to the dumps. Small quantities of surface soil are carried down from the hill above but not enough to require separation or to cause interference with treatment in the mill. The old tunnels have been cleaned out and are utilized for tramming. They are being connected by crosscuts to form an extensive track system and to ventilate the workings. No timbering is needed in these tunnels as they are driven in an exceptionally solid porphyry.

All the ore is hand trammed to an orebin near the outer edge of and below the orebody. The ore is discharged from the bin through finger gates into two-ton self-dumping ore cars and is taken over 800 ft. of tramway to the rock-crushing plant. At present trains of two cars are pulled by one mule but an electric locomotive will be used in the near future. An electrically driven air-compressor plant is installed near the mine on the same level as the main tram and in this building are the blacksmithing and drill-sharpening shops. All mining is now done on the day shift although plans are under consideration for illuminating the workings, so work may also be done at night.

The Mill Building

All the mine buildings are built of wood; the lumber and timbers were cut on the ground. A complete sawmill, including planing and mortising machinery, was installed and is still operated by the company. The method employed in excavating the mill terraces out of solid rock was rather novel. Holes were drilled



Sections of Trinity Orebody

and blasted to form the upper terrace and the broken rock was sluiced out with hydraulic giants. The lower terraces were made in succession by the same method. So accurately was this work done by blasting and piping that a hand trim of less than 6 in. was afterward required. In grading 20,000 cu.yd. of hard rock was excavated at a cost of 20c. per cu.yd. The heavy mill bents were framed on the ground and hoisted to place by donkey engines. Work was started on the mill in April, 1910, and was completed in November; the stamps were started Dec. 3, 1910.

The mill, rock-crushing plant, store house, assay office, refinery, compressor house, office, manager's residence, cottages for employees and commodious bunk and boarding houses were erected and the hydraulic plant completely installed, while at no time were more than 150 men employed. The problem of securing enough labor and maintaining a proper commissary was rather difficult as the operations were in a sparsely-settled district at a considerable distance from the railroad.

Crushing the Ore

The rock crusher is housed in a separate building apart from the mill and cyanide plant. The ore from the mine is dumped upon a grizzly, with 1-inch spacing. The undersize passes direct to conveyers; the oversize into orebins, thence into a 12x20-in. Blake crusher, crushing to 3 in. and discharging on a grizzly with 1-in. spacing. The grizzly oversize is fed to a 9x12-in. roller-jaw crusher, crushing to 1 in. and discharging directly on the conveyer belt. A 50-h.p. motor drives both crushers. Two men working one shift operate the plant. Discharging on the main belt conveyer at the same point where the ore is received, is a short belt conveying lime. To neutralize the acidity of the ore, 5 to 8 lb. of lime per ton of ore is required. The lime belt is driven by a ratchet and worm gear, operated by the tail pulley of the main conveyer.

Running through a covered passageway, a 16-in. belt conveyer carries the ore into the main mill building. This conveyer discharges on a second 16-in. conveyer which runs over the bin. The second conveyer is equipped with an automatic tripper which can be shifted along a track upon the bin and which automatically discharges ore at any point. The ore can be discharged on either side of the conveyer and as the tripper can easily be shifted, no difficulty is experienced in maintaining an even distribution in the bin. Each conveyer is driven by a 5-h.p. motor, geared direct to the head pulley of the conveyer belt.

The orebins are 24 ft. deep, 20 ft. wide, 81 ft. long and hold 1000 tons. This provides sufficient storage to avoid a mill shut-down following any ordinary accident in the mining operations. No gates are provided; the ore discharges directly into the automatic feeders.

Four batteries of 10 stamps each are installed. The mortars are patterned after the Homestake type to attain large capacity and fine comminution. The stamps weigh 1100 lb., make 102 six-in. drops per minute and crush in cyanide solution through a 30-mesh screen. From three to four tons of cyanide solution, containing 2 lb. of cyanide per ton, are used in the mortar for each ton of ore crushed. Due to the extreme agitation in the mortar, over 50 per cent. of the total gold recovered is dissolved before the pulp passes the screen. The battery foundations are timber set in concrete. Two 50-h.p. motors under the orebins drive the stamps, each motor driving 20 stamps. A belt tightener of special design is provided and by its use the stamps can be started from rest without hanging up.

The pulp from each battery flows to a 48-in. double cone classifier adjusted to carry fine sand in the slime, as better extraction is effected than would be the case were slime to enter the sand vats. Some

difficulties have been experienced from the foaming caused by the lime. In fact this trouble extends throughout the entire plant, a thick layer of foam in appearance like chocolate filling, being formed on the top of the classifiers, vats and agitators. For proper classification three to four tons of solution per ton of pulp is required.

Leaching the Sand

There are four sand vats, each 30 ft. diameter, by 7 ft. staves and 170 tons capacity. The sand is distributed by a 30-ft. Butters distributer hung from a crawl. From three to six tons of solution per ton of sand is continuously added and the period of contact, before washing, is 150 hours. An extremely flexible system of piping is provided, so that solutions can be carried to the gold tanks, slime overflow to the thickeners, or wash water to the mill stock tank. The sand assays $2.50 to $3 before treatment, the tailings about 45c. per ton; only a trace of cyanide is found in the discharged sand. The vats are provided with bottom discharge doors operated by handwheels. The gates are 10 in. diameter at the throat and can be lowered 7¾ in., giving ample passageway for the tailing, which is washed out by automatic sluices suspended from crawls running on the same track as the distributors. There are two sluices and a 3-in. hose connection is placed near each vat to supply water under pressure for their operation. The sluices are similar to those used in the North Star mills at Grass Valley. Not more than eight hours are required to remove the entire charge. After the sand has been removed, the vat is given a thorough washing with a hose, before a new charge is filled.

Treatment of the Slime

The slime from the classifiers contains four parts water to one of ore and runs direct to the pulp thickeners. The first thickening is done in two Dorr thickeners, each 25 ft. diameter by 12 ft. staves. The pulp is thickened to a consistency of 2:1 and the time of passage through the thickeners averages 12 hours. After the first thickening, the pulp is diluted to a consistency of 3:1, then flows to the agitators. After agitation the pulp is returned to the second pair of thickeners, exact duplicates of the first pair and is thickened to a consistency of 1½:1 for delivery to the filters. The average time of passage through the second thickeners is about 20 hours. The overflow from the pulp thickeners goes direct to the clarifying tank. Each pair of thickeners is belt driven by a 5-h.p. motor.

There are two Pachuca agitators, 12 ft. diameter and 25 ft. high. The agitators are made of steel plates, 3/16 in. thick. The central air tubes are made of No. 12 gage steel and are 26 in. diameter. Air at 40-lb. pressure is supplied to the agitators from an electric-driven Ingersoll-Rand 10x12-in. compressor. The agitation is continuous, the average time of contact being eight hours. An air lift is used to facilitate the handling of the pulp between the agitators and the thickeners.

The thickened slime flows to two Oliver filters, each of 75 tons capacity per 24 hours. The wash water almost completely displaces the solution, as tailing assays show only a trace of cyanide and less than 10c. dissolved metal, while the insoluble or undissolved metal is between 20 and 50c. per ton. The cake assays of the pulp fed to the filter show a value of $2 per ton of dissolved metals. The pulp enters the filters direct from the thickeners, a constant level being maintained in the filter tanks by a float valve on the supply tank. But little trouble has been experienced by lime clogging the filter cloth and treatment to remove the coating will not be necessary oftener than once in eight weeks. A wet vacuum pump with a single cylinder 14x12 in., running at 90 r.p.m. and having no valves in the suction ports, was especially designed for use with the Oliver filters.

The overflow solution from the pulp thickeners is quite turbid from fine slime, in suspension. To remove this before precipitation, two clarifying tanks are installed, each 25 ft. diameter by 12 ft. staves. The bottoms of these tanks are covered with canvas and 6 in. of sand. In the laboratory three layers of filter paper are required to clarify the solution from the thickeners. When the filter on the Oliver filters is in good condition, the filtered solution is perfectly clear but as blow holes occasionally appear, the filtered solution is pumped into the clarifying tank.

Precipitation of the Gold

After the solution is drawn from the clarifying tank it is run into the gold tank preparatory to precipitation. The Merrill zinc-dust process is used. The zinc emulsion is made in a small cone, supplied with solution taken by a small pipe tapped into the main pipe leading from the solution pump to the precipitation presses. The solution and zinc dust from the feeding belt are fed into the cone at the top, while compressed air is introduced at the bottom. The agitation thus given forms a well mixed emulsion which passes out of the cone through an overflow opening and into the suction pipe of the solution pump. From ¼ to 1/10 lb. of zinc dust is consumed per ton of solution. A 5x6-in. triplex pump is used to pump the pregnant solution to the filter presses. A 5-h.p. motor is geared direct to the pump while a pulley on the main pump shaft moves the zinc belt at the speed of 3 ft. per hour. Two Merrill filter presses are used for collecting the precipitate. Each press has 20 frames, each 36x22 in., with a capacity of 250 tons of solution per 24 hours. Air for drying the precipitate is taken from the compressed-air system of the mill. The barren solution is returned by gravity to the solution sump and is elevated by a 5x8-in. triplex pump to the stock-solution tank on the battery level. Assays of the barren solution show a precipitation of 99 per cent., and a cyanide strength of 2.2 pounds.

Refinery and Power Plant

Electric-driven triplex pumps are used to handle the weak gold solution, pumping them back to the sand vats and stock-solution tank. An electrically driven Ingersoll-Rand air compressor, 10x12 in., of the inclosed type, furnishes compressed air for the entire mill. It is equipped with an automatic unloader and delivers air to a 42-in. by 12-ft. receiver, at a pressure of 40 lb. per sq.in. Water is supplied to all parts of the mill from three tanks having a capacity of 75,000 gal. and set on the hillside 120 ft. above the battery level. Five hydrants and fire hose are distributed at convenient points throughout the mill, while outside protection is furnished by hydraulic giants.

The assay office and refinery are housed in a separate building some distance from the mill. A Faber du Faur furnace, using distillate for fuel, is used to melt the precipitates. Distillate is used for fuel in the cupelling furnace. The usual equipment of grinders and crushers driven by an electric motor is provided. A complete series of assays, covering all operations, is made, keeping the milling and reduction processes under control at all points.

Electricity is used for lighting and power about the entire property. It is generated by water taken from Coffee creek, carried by a flume 9000 ft. long, to the power house and delivered to a Francis turbine under a head of 107 ft. Three-phase alternating current at a pressure of 4000 volts and a frequency of 60 cycles is generated and transmitted a little over a mile to a substation near the mill. Here the voltage is cut down to 440 volts for the motors and 110 volts for the lighting. The turbine is rated at 600 h.p. and is direct connected to a generator rated at 400 k.v.a., at 80 per cent. power factor. The turbine is controlled by a Lombard governor, while a Tirrell automatic regulator is used to maintain a constant voltage. The present load on the plant is about 200 kw.

Because of the large amount of sand and detritus brought down from hydraulic operations above, it was not deemed advisable to put in a permanent dam at the point of diversion of the power water supply. Instead a temporary dam of rocks and bush will be built every summer, with the expectation that spring freshets will sweep it away with any impounded detritus.

Genesis of Northern Ontario Ores

By George C. McFarlane*

As silver-ore deposits are found only in limited areas of an enormous expanse of Laurentian and Huronian rocks in Northern Ontario, it is argued that the silver minerals underwent segregation at depth and only small quantities were redeposited as veins near the surface by magmatic waters.

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The forests of northern Ontario cover many thousand square miles of rock that is practically identical with the geological structure of Cobalt. Probably every prospector that has scratched the moss and dirt from these rocks and blasted into the tight cracks and calcite leads that he may have uncovered, has wondered why he or at least some of the prospectors in his neighborhood should not discover silver. Notwithstanding the many wild rushes and excitements, thousands of prospectors have searched over the whole country without finding anything that remotely resembles profitable silver ore in the hundred-mile stretch between South Lorain and Gowganda.

If the surface geological structure has any bearing on ore occurrence, it seems strange that all the silver leads should be confined to a small area of a few thousand acres about the town of Cobalt. According to the reasoning of the men who prospected the country, every seam or calcite stringer found near contacts of conglomerate, Keewatin and diabase was a potential silver vein because they knew that the great mines of Cobalt had often followed a crack or calcite seam down a few feet into nearly solid silver. As we know now, aside from the lucky few around Cobalt station and two or three other widely separated points, the work of these thousands of plucky searchers was without result. The results in northern Ontario raise the question whether our present knowledge of the origin and formation of ore deposits is of any aid in prospecting a country. In many cases it seems to have caused an unnecessary expenditure in minutely prospecting large areas because of supposedly favorable geological structure and resemblance to the rock of Cobalt.

Area of Silver Deposits Limited

The theory that silver and gold ores are leached from the country rock either by descending surface water or ascending magmatic water or a combination of both is hardly tenable in the Cobalt district. The whole stretch of Laurentian and Huronian rocks along the hight of land and the north shore of Lake Superior from the Quebec boundary to Manitoba is characterized by isolated deposits of exceptional richness at widely separated points. Regardless of the extent of favorable rock formations the ore is usually bunched into a small compass and surrounded by large stretches of barren or nearly barren rock. A single ore-shoot in the Sultana and in the Mikado mines produced nearly all the gold taken out at the time of the Lake of the Woods excitement. A tiny islet near Thunder cape produced from one shoot three million dollars worth of silver, but stretches of similar rock along the mainland, although thoroughly prospected, have yielded scarcely anything. Great as is Cobalt, its mines cover a comparatively small area and outside of the limits what little precious metal is found is generally gold and not silver. The same may be said of the newer camp of South Lorain, where the silver seems to be confined to a much smaller area. The most probable theory of the origin of these ores is that they were brought up by magmatic waters from extremely rich concentrations or segregations of precious metal in the underlying magma.

While we have no means of positively determining the inside structure of the earth, the weight of evidence now available indicates that the heterogenous arrangement of rock formations passes by easy stages into a homogenous fluid magma at a depth of less than seventy miles from the surface. The computers of the U. S. Coast and Geodetic survey have calculated, from the marvellously accurate observations on the deflection of the prime vertical caused by topographical irregularities, that the material composing and underlying mountain chains and plateaus is of less density than that underlying the great valleys and costal plains and the adjoining ocean beds. That is, the material in the outer crust of the earth is so arranged that at a depth of not more than seventy miles below sea level, the continents and ocean and every portion of them exert an equal downward unit pressure on the magmatic spheroid.

Origin of Eruptive Rocks

This condition of isostacy shows that the earth is elastic and readily changes shape to accommodate unequal loading produced by erosion of the land masses and deposition of sediments on the ocean floor, the formation of polar and glacial ice caps and the shifting of the material underlying the solid crust. As the earth's shell is isostatic now, it must have been throughout the course of geologic time, and during all this time there must have been continuous readjustments within the earth to compensate the tremendous erosion the land masses have been subject to during this time. The surface agencies have always tended to level the surface of the earth, it is probable the interior agencies always tend to increase continental elevation. If the inside of the earth is a hot fluid magma, the isotherms must follow the approximate contour of the surface. Now if we believe in the nebular origin of the sun and planets, from the present observed rate of cooling of our earth the cooling process has not penetrated far below the surface, and most likely at a depth of a hundred miles or so the fluid magma becomes incandescent gas, increasing in temperature with depth.

Magmatic Waters and Segregations

At the present time the earth loses about twenty thermal units per square foot of surface per year. This radiation is causing a continuous liquefaction of the gaseous core of the earth, the more refractory elements forming magma and the lighter and less easily liquefied elements, like oxygen and hydrogen, bubble up through the magma and tend to collect in the thermal anticlines underlying the continents, impregnating the magma with gas blebs, making it of less density and thereby tending to uplift the overlying crust. At some stage of its upward travel the oxygen and hydrogen would unite to form water, giving out a great deal of heat. At a point perhaps ten miles below the surface the rising steam would liquefy, liberating a thousand odd degrees of latent heat. This liberation of heat by ascending gas and steam would tend to form a thick layer of magma of fairly uniform temperature, and in this zone it is probable that the crystalline eruptive rocks were formed. It is more than probable that the heavy metals existing in minute quantities in the primal magma gradually settled out as crystallization proceeded and collected in zones much as slag, matte, speiss and metal settle in the hearth of a furnace. The flow lines caused by the eruption of the overlying magma would tend to concentrate the segregations of metal still further.

It is probable that the magmatic water released by the slowly liquefying gaseous core of the earth only penetrates upward to the surface with great difficulty, as ordinarily it could scarcely penetrate the

pasty or semifluid magma underlying the cold crustal rocks.

While the solid outer crust of the earth is easily penetrated by magmatic water, the under crust is effectually waterproofed by the zone of semi-fluid magma and this trapped water becomes effective in causing continuous continental elevation. Perhaps after heavy flows and outpourings of the magma, the crust rocks are forced down into the more fluid magma and the magmatic waters then find vent to the surface until the seams in the overlying rock are sealed by the thickening magma.

The sequence of eruptions in the Cobalt region shows the magma to have undergone a fairly complete settling and differentiation. The first flow was the Lorain granite, followed by a tremendous outpouring of diabase and gabbro, and as this gabbro in South Lorain is cut by a small dike of olivine diabase, there must have been a third eruption of still more basic rock. If the primal magma settled into layers of successively heavier rock, it is reasonable to suppose that the metals in the primary magma settled also and formed rich segregations too far down to be brought up by the flows. Following the rock eruptions the deep-seated magmatic waters found vent in different places, if a rich segregation of silver happened to lie in the path of any of the magmatic water courses, the metal would be freighted up and deposited in the surface seams over this particular vent. It is evident that the great majority of these ascending water courses did not encounter silver segregations, but a good number must have passed through segregations of lead, arsenic, bismuth, copper, nickel and cobalt, as these metals are widely distributed although seldom in commercial quantities.

Decline of Sheet Ore Mining at Joplin

By Temple Chapman *

The increased costs of labor, dynamite and power, together with the high initial investment required, make sheet-ore mining unprofitable when concentrates sell for $40 per ton.

*Mine operator, Webb City, Mo.

For 10 years the mining of sheet or blanket ore has been a growing industry and by 1908 produced fully half of the zinc and lead sulphides mined in the Joplin district. The so called sheet ore consists of a horizontal bed of flint about 20 ft. thick, in which occur little seams of zinc and lead sulphides, and which extends in practically a continuous mass for a dozen miles across the Webb City camp. There is a separate and apparently smaller mass in the Joplin camp.

The average yield of zinc and lead concentrates has probably been from 2½ to 3 per cent. of the ore mined, which at an average selling price of $40 per ton for concentrates, is equivalent to a value of $1 per ton of crude ore. Prospecting, development, equipment and operating costs have to be paid out of this dollar and the majority of the mining companies have also had to pay a royalty of from 10 to 20 per cent. of the gross value of the ore. Mining companies have undoubtedly experienced a net loss, while the landowners have made a profit or perhaps between the two there has been an even break or small net loss for the whole business of sheet-ore mining.

Zinc Produced at a Loss

Some individual mines stand out as conspicuously profitable—too conspicuously—for it has been their very isolation that has made their success so prominent; hidden the many failures and drawn in new companies. The ease with which sheet ore is found by drilling and the large acreage that can certainly be proved by a few drill holes has induced many conservative companies to enter this field of mining. With a large tonnage of ore blocked out, though confessedly lean ore, each new company would endeavor to surpass its neighbor by thoroughness of mine equipment and capacity of plant, and thus expect to reduce mining and milling costs to a point where working the lean ore would be profitable. With so much money invested the company would be loathe to give up the battle when confronted with operating losses and would continue mining while hoping for better prices and experimenting in cutting costs. Thus dozens of mines have produced tens of thousands of tons of zinc at actual net loss.

By far the larger part of sheet-ore mining has been done in the upper 8 or 10 ft. of the orebody. The 20-ft. ore-bearing flint horizon is locally divided into two 7-ft. pay strata, separated by a barren rib. A large number of the mines have worked only an 8-ft. stratum, while a few have followed this work by mining the lower 12 ft. A few mines have worked the whole orebed at once. The top layer has been much richer in both zinc and lead, but after it had been removed it was found that the lower half of the ore could be mined much more cheaply, it was easier to break, making possible a marked saving in labor and dynamite. Though the quantity of zinc obtained from the lower layer was less, the quality was better, the concentrate assayed 63 per cent. zinc and was free from lead. Between the upper and lower strata occurs the stratum of barren flint, 6 ft. thick, which in actual mining had been gone over when the upper layer was worked and has had to be taken when the lower layer was mined, as it was not economical or practical to leave it.

Costs Are Increasing

Out of his necessities the sheet-ore miner has improved his methods of mining and milling but has not lowered materially the cost (as has been supposed), and costs may be expected to increase in spite of improved methods. The larger plants, to be sure, have shown lower operating costs per ton of ore, but the difference is offset by the amount that must be allotted for repayment of the much larger initial investment when spread over the rather short life of the individual mine. The costs, however, are low compared with other mining districts, considering the extreme hardness of the rock and low working face. The principal increases in working costs have been as follows: Labor has increased 10 per cent. in five and 20 per cent. in 10 years; dynamite has increased 20 per cent., or from 10 to 12c. per lb.; power has increased 10 per cent.; coal, including freight, has advanced from $2 to $2.25, and natural gas, formerly 10c. per 1000 cu.ft. is now 12½c. in summer and 15c. in winter. Labor constitutes 52 per cent. of the cost of mining, powder 20 per cent. and fuel 12 per cent. Smaller items, such as lumber, have also advanced. All costs and prices increased in 1907, but while the price of zinc and lead has dropped markedly since then, costs have remained quite as high as the highest figures of that boom year, dynamite and fuel being higher and wages just as high. So the best of management, backed by the best equipment, has found it hard to reduce expenses.

Soft-ore Mines More Promising

What is now arresting the progress of sheet-ore mining is that sentiment is turning against it; that is, the prospector and operator have abandoned the sheet-ground area, largely prompted by their poor success there, but also because of the encouragement offered by the rather dazzling rich strikes made in virgin ground and new fields. Ore yielding 10 to 50 per cent. in concentrate is being found in half a dozen widely different places, most of which were formerly thought to be outside of the ore-bearing areas, such as the Thoms Station camp, west of Webb City, the new finds north and west of Carl Junction, and those

north of Neck City and Carthage. None of these new discoveries will require such large initial investments as did sheet-ore mines, while because of their richness they promised to yield large profits on a $40 ore market, the price which forces sheet-ore mines to close down.

The Joplin district as a whole has shown for 10 years a remarkably regular production of zinc ore, of about 5000 tons per week and whatever decrease may occur from the working out of the richer or the shutting down of the poorer sheet-ore mines will be made up by the output of the new producers of the soft-ground or cavern type of deposit.

The wide extent of the workings attained by sheet-ore mines (some mines have worked out a continuous room 3 or 4 miles long) have benefited the district by showing the mine investor that the occurrence of zinc ore is not wholly undeterminable and spasmodic, but that the deposits have a certain regularity and good results may often result from scientific and common-sense prospecting and development. Even many of the best and seemingly isolated bunches of soft ore have eventually proved to be a part, perhaps the swelling or enrichment, of a wide-reaching sheet-ore range.

The Value of Drilling

One practical consequence of the wider knowledge of ore formations has been the discontinuance of the practice, prevalent 10 years ago, of building a mill on a shaft sunk into ore of unknown value and extent.

Now it is realized that a moderate investment in drilling will so thoroughly prospect an orebody as to reasonably insure the larger investment needed to develop and equip the mine. It has been the growth of this very conservativeness that has led so many people into large investments in sheet ground, but that has been because they have been too much carried away with the mere extent of the ore developed to be aware of its leanness, this being partly because in drilling through so thin an orebody as 7 ft., it has been difficult to distinguish between rock which would yield a saving of 2 per cent. and that which yields 4 per cent., especially if the neighboring mine was actually milling the wished-for percentage.

Heat Conduction through Furnace Walls

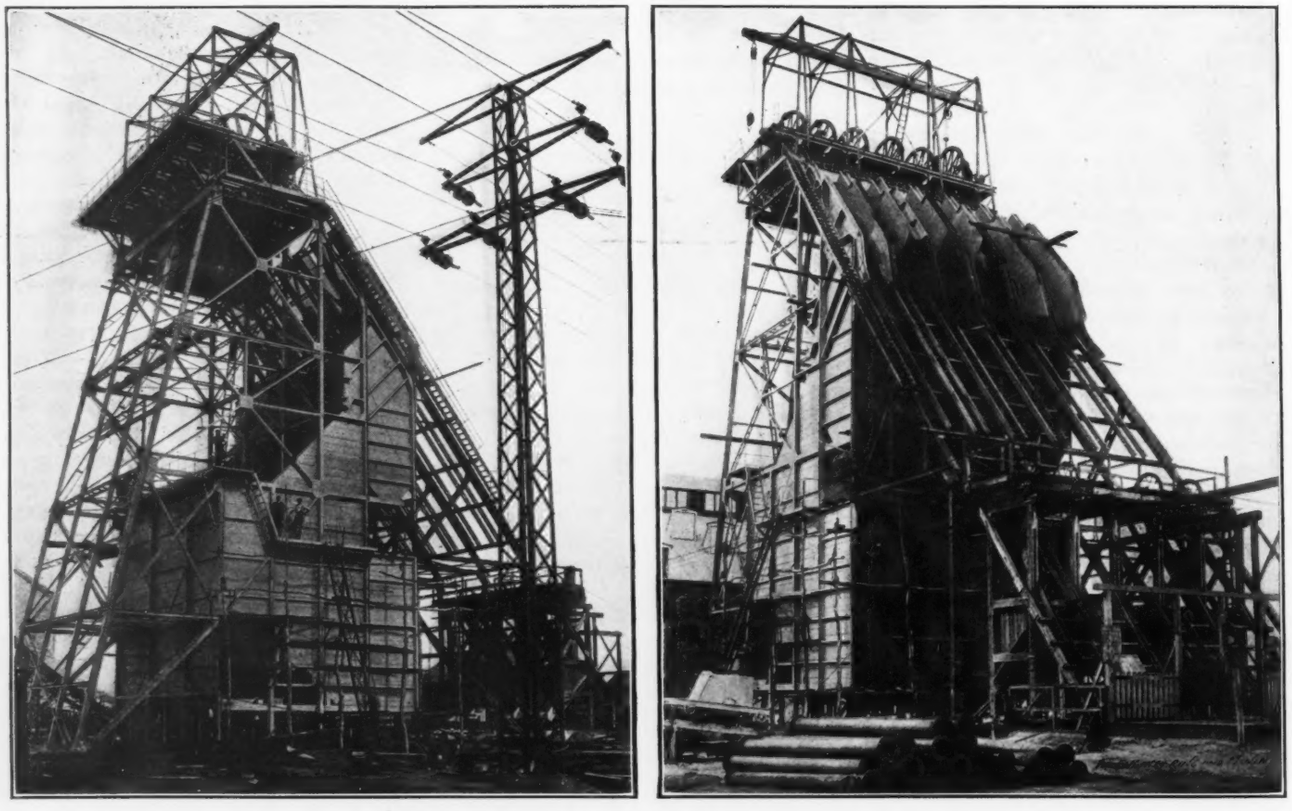
In a recent investigation by Ray and Kreisinger into the flow of heat through furnace walls, the rather surprising conclusion is reached that an air space in a furnace wall is not usually so good for confining heat as is the same thickness of firebrick.[1] This is especially true if the air space is near the fire side of the wall. While conduction is low across the air gap, radiation is usually great, since radiation varies as the fourth power of the temperatures of the sides of the space, and these temperatures are usually high. Consequently, combined radiation and conduction across the air space exceeds the conduction of heat across a similar space of the better conductor, firebrick. According to these investigators, if it is desirable to build a wall in two essentially separate layers, the space should be filled with sand, crushed brick, ashes, or other similar material.

[1]*Bull.* U. S. Bureau of Mines, No. 8.

A New Rand Headframe

By Rowland Gascoyne*

The accompanying illustrations are from photographs of a new steel headframe recently completed at the West Rand Consolidated mine near Krugersdorp in the Transvaal.



New Headframe of the West Rand Consolidated Mines

The new headframe was built over the old wooden structure without interference with hoisting until the steel work was practically finished. The hight from shaft collar to top of sheaves is 92 feet.

The storage capacity of the orebin is 1000 tons, the bin for waste holds 150 tons and there is a tank for water of 6000 gal. capacity. Steel has been used throughout the structure as far as possible in order to reduce risks from fire. Above the sheave there is a gantry frame carrying tracks for a crawl for supporting chain blocks.

*Box 3257, Johannesburg, Transvaal.

Assaying Diamond Drill Samples

By W. J. Mead *

A rapid method of calculating the relative quantities of core and cuttings that should be taken for assaying samples obtained by diamond drills.

*Department of geology, University of Wisconsin, Madison, Wis.

The proper interpretation of assays of samples obtained in diamond drilling is an extremely important phase of this method of exploration. In drilling with a diamond drill, material is recovered from the hole in two forms, the solid core of rock or ore, and the finely ground cuttings or sludge. The length of core recovered is almost never equivalent to the distance drilled, because the core does not remain intact in the core barrel but breaks in short lengths, the ends of which, especially if soft, are ground against each other in the process of drilling. This ground portion of the core is washed from the hole with the cuttings, and consequently the sludge represents both the material cut by the cutting ring of the bit and the material resulting from the grinding of the core. When, on withdrawing the drill rods from the hole, a part of the core slips from the bit and cannot be recovered, it is necessary to pulverize it in the bottom of the hole with a chopping bit, and to wash this chopped material from the hole before continuing to drill. This chopped core is, of course, also added to the sludge.

Determining Average Assay

It is common practice in the Lake Superior iron districts when drilling material requiring assay to divide the hole into 5-ft. runs or samples for analyses. In the matter of obtaining the average assay of these samples, practice differs rather widely. The several practices are briefly as follows:

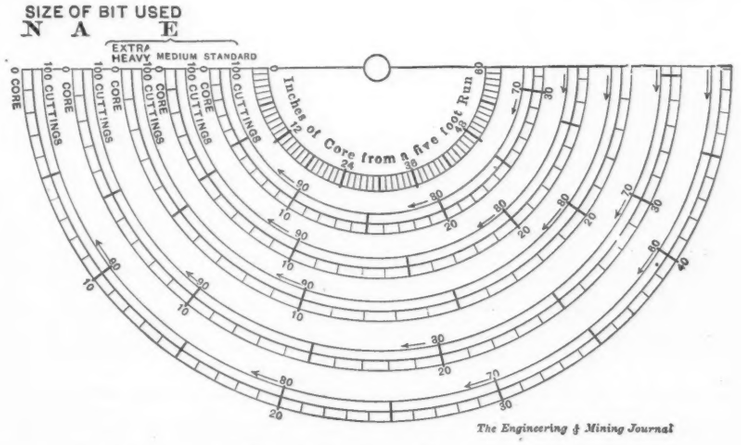
(*A*) All the core and all the cuttings from a 5-ft. run are combined for assay in one composite sample. This would yield a correct mixture of core and cuttings only when all of the cuttings are recovered. With only a partial recovery of cuttings too much weight would be given to the core. This method is also open to considerable criticism from the standpoint of the geologist. One of the important objects of drilling is to determine the structure of the bed and secure other geological data.

(*B*) Cuttings alone assayed. This method allows a possible error, as in drilling, the core and the cuttings differ in iron content because in general, hard layers are represented in the core to much greater extent than soft layers.

(*C*) Core alone assayed, the cuttings not being collected. Because of the small amount of core usually recovered and the difference in iron content of hard and soft layers, this method allows considerable error.

(*D*) Separate assay of the core and cuttings averaged by giving them equal importance—that is, adding the assays together and dividing the sum by two. This practice is obviously incorrect, as it will be shown that the relative importance of core and cuttings is never in the ratio of 1: 1, and in the majority of cases does not approach the ratio of even 3 parts of cuttings to 1 of core.

(*E*) Probably the most rational method of obtaining a true assay of a 5-ft. sample (but employed only to a limited extent) is to assay both the core and cuttings separately and to combine these two assays in proportion to the actual quantity of core and cuttings in the sample. This method is somewhat more complicated than any of the preceding, and with a view of removing some of the mathematical difficulties, I have developed the accompanying diagram, which indicates automatically the proportions in which assays of core and cuttings from a 5-ft. sample should be combined to give a correct average of the material drilled.



Device for Calculating Proportions of Core and Cuttings in Samples

Operation of the Diagram

In order to use this method it is, of course, necessary to know the number of inches of core recovered from each 5-ft. run. The inner semicircle of the diagram is divided into 60 equal divisions representing inches in a 5-ft. run. Each of the five semicircular scales refers to a certain size of bit. The sizes of the bits indicated are those manufactured by Longyear & Hodge, of Marquette, Mich. The outside and inside diameters of these bits are as follows: E standard, 1½ in., 31/32 in.; E medium, 1½, 29/32; E extra heavy, 1 17/32, ⅞; A standard, 1 25/32, 1 5/32; N standard 2¾ in., 2 1/16 in. If a line be drawn from the center of the semicircle through a point on the inner semicircle indicating the number of inches of core recovered, to the semicircle representing the size of the bit used, the ratio of core to cuttings may be read directly on the latter scale. For example, if 12 in. of core are recovered using an E extra-heavy bit, the ratio of core to cuttings is 5: 95. In other words, if the total material from the 5-ft. run represents 100 units, the core represents 5 and the cuttings 95 units. Therefore, the correct average assay would be obtained by multiplying the assay of the core by 5, and the assay of the cuttings by 95, and dividing the sum of the products by 100.

If 5 ft. of core are recovered from 5 ft. of drilling the relative importance of the core and the cuttings is measured by the cross-sectional area of the core compared with the cross-sectional area of the cutting ring of the bit, proper allowance being made for clearance of the diamonds both inside and outside of the ring. Therefore, by measuring the cross-sectional areas of the various sizes of bits used, the ratio of core to cuttings when 5 ft. of core is recovered may be computed. These figures furnish the ratios shown at the right hand of each of the semicircular scales. If no core whatever is recovered the cuttings obviously represent 100 per cent. of the sample. Therefore the percentage of core varies from zero to a certain maximum, fixed by the cross-sectional dimensions of the bit, and the percentage of cuttings of the sample varies from a certain minimum fixed by the cross-sectional dimensions of the bit

to a maximum of 100 per cent. The scales are divided in equal divisions between these limits for both core and cuttings. It is seen that for every position on the scale the percentage of core and cuttings are complementary, that is, always total 100 per cent. It will also be noted that the percentage of cuttings is read from right to left, and the percentage of core from left to right.

The accuracy of the diagram may be slightly affected by the reduction in diameter of the core through wear in the core barrel, the influence of which is to make the cuttings still more important. In this method and in fact, in all assays of cuttings it is assumed that the cuttings recovered are representative of all of the material ground in the hole. This is believed to be for all practical purposes correct except in cases where the porosity of the formation allows an escape of part of the water forced down the drill rods in drilling, thus allowing the possible separation through difference in density with a tendency for the heavier particles not to be washed from the hole. This is an error which is common to all methods of sampling diamond-drill holes.

ASSAYS OF CORE AND CUTTINGS.

		Inches of Core.	Size of Bit.	Per Cent. Iron.	Average Using Diagram.	Average Core and Cuttings, Ratio 1:1.
Drilling in soft ore....	Cuttings....	24	E. Med.	51.55	48.23	36.37
	Core.....			21.20		
	Cuttings.....	9	E Med.	44.15	43.48	37.10
	Core.....			30.05		
	Cuttings.....	37	E Med.	48.95	46.35	41.47
	Core.....			34.00		
	Cuttings.....	11	E Med.	45.45	44.68	37.55
	Core.....			29.65		
Drilling in hard ore....	Cuttings.....	31	E Med.	28.80	30.74	35.63
	Core.....			42.45		

EXAMPLES OF ACTUAL ASSAYS

In the accompanying table are actual assays of core and cuttings obtained from drilling in the Crystal Falls iron district of Michigan and are typical of a large number of similar assays. In the second column of averages the assays of core and cuttings are combined in equal proportions and in the first column the assays are combined in the correct proportions as indicated by the diagram. In each case a noteworthy difference in average iron content is obtained.

The proper averaging of core and cuttings is a matter of importance, especially when the material drilled is on the border line between ore and rock. In some of the Lake Superior iron districts it is commonly believed that the assays from diamond-drill holes in general are lower in iron than the average of the ore as subsequently mined. In other places the converse is observed. It is probable that these variations between assays obtained in drilling and in mining may be due largely to misinterpretation of the samples recovered in drilling. The relative unimportance of the core when only small amounts are recovered shows that the average assay is practically unaffected by retaining from the sample several inches of typical core for geological purposes, and also that essentially correct average assays may be obtained by assaying only the cuttings where the recovery of core does not exceed 10 in. in a 5-ft. run.

Diamonds in German Southwest Africa

Diamonds were first found in German Southwest Africa at Kolmans kop, in Luederitz bay, by a Kafir boy named Mrokan, who, not knowing what the bright stones were, handed them to his "boss," August Stauch, who promptly took out eight claims, which were registered in Swakopmund by the Kolonial-Gesellschaft on May 14, 1908. Since that date more than 400 claims have been taken up by various private companies and individuals, and the German government has been granted 30. The diamonds are found in sand dunes, and not at a greater depth than three inches from the surface. The total monthly output amounts to 14,000 carats. The diamonds are small, averaging about three stones to the carat, although some nine-carat stones have been found, and are selling at Cape Town at about 26 shillings per carat.

The country consists principally of gneiss, granite, hornblende-dolerite and sandstone conglomerate of Cretaceous age. The surface is covered with sand dunes, and the sandstone conglomerate furnishes the diamond fields with a brackish water, the salts of which are accounted for by the decomposition of the feldspar contained in the granite and gneiss. The lime is changed into a carbonate, and the other salts, being more soluble, are leached out, and collect in the water below the surface.

Various theories as to the origin of the stones are: (1) That the diamonds have come from the Orange river; (2) that they have been directly derived from the sea; (3) that they are locally formed, and that the hornblende-dolerite is the matrix; (4) that they were deposited contemporaneously with Cretaceous sediments occurring there, and that these beds on disintegration were concentrated by the wind in the valleys; (5) that the diamonds originated from the area of the Vaal river, and were carried into the sea by the Orange river, the distribution along the coast having been effected by ocean currents, and finally by the wind in a northerly direction inland.

While admitting that the occurrence of numerous waterworn pebbles of agate, etc., along the present coast, as well as some miles inland at an altitude of 150 ft. above sea level, make the latter view appear feasible, Mr. Ashmore's theory is that all the diamonds are essentially pipe stones, derived from kimberlite pipes, dikes, or sheets. He explains that he has found them with flaws and unwaterworn crystals (dodecahedra and octahedra), and also sharp splinters, all of which goes to suggest pipe stones. Again, most of the accessory minerals which occur in pipes of blue ground in South Africa have been found here also, namely, bort, serpentine, olivine, jasper, corundum, garnets, agate, ilmenite, quartz, magnetite and chromium diopside. The following, so far as Mr. Ashmore's examination went, are missing: Vivianite, topaz, spinel and bronzite; but it is not every pipe in South Africa that exhibits this complete series. Since his visit in November, 1908, he has been informed that both yellow and blue ground (or kimberlite) have been found.

NOTE—Abstract of a paper by G. Percy Ashmore, presented Feb. 11, 1911, before the North of England Institute of Mining and Mechanical Engineers.

Separation of Iron, Alumina and Chromium

The mixture of oxides of the three metals is fused for seven hours with sodium carbonate in a platinum crucible, leached with water and the iron filtered off. An excess of ammonium nitrate is then added, which throws down the alumina. This is filtered off, after which the filtrate is acidified with nitric acid, the chromate reduced with alcohol and an excess of ammonia added, which precipitates the chromium. To obtain the latter in a pure state it must be redissolved in hydrochloric acid and reprecipitated with ammonia. It is claimed by Tcharviani and Wunder (*Ann. Chem. Analyt,* 1911, 16, 1-7) that neither precipitation with ammonia from an acid solution, whether sulphuric, hydrochloric, or nitric, nor from an alkaline solution, after decomposing the aluminate with ammonium chloride, gives such a pure alumina precipitate as the above method. The chromate is rapidly and completely reduced by alcohol in presence of nitric acid.

Dommeldange Electric Steel Plant

By Alfred Gradenwitz *

The equipment comprises two single-phase alternating-current furnaces, one three-phase furnace and a tilting Wellman mixer. Steel produced is of homogeneous texture.

*Regensburgerstr. 3, Berlin, W., Germany.

In view of the results obtained in an extended test, Le Gallais-Metz & Co. entrusted Siemens & Halske with the installation of a large plant for the production of ingot iron and high-grade steel from pig iron in Kjellin & Röchling-Rodenhauser electrical furnaces. This plant, which is the first of its kind, comprises two single-phase and one three-phase alternating-current electric furnaces; a foundry and extensive shops equipped with special machine tools for the working of steel castings.

General Arrangement of Plant

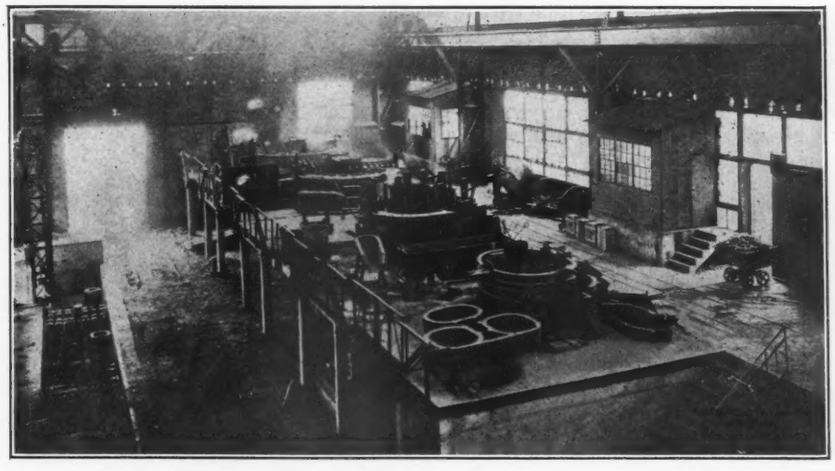
All the apparatus carrying high-tension currents, such as transformers and fuses, oil switches, high-tension busbars and section switches, etc., are installed in cells below the switchboard, in the basement. In the same room are located the two regulating starters of the starting motors, controlled from the switchboard. The section switches are so arranged as to allow each generator to supply either of the alternate-current furnaces.

Five cables, laid out in a well ventilated masonry channel, lead from the converter station to the furnace house situated about 40 m. distant and the three furnace-switch cells, which are equipped with the same apparatus as the converter-house cells. The furnace platform is situated about 3 m. above the floor of the steel works, being connected to its southern wall and contains, in addition to the three furnaces, a tilting Wellman mixer of 15 to 20 tons capacity, a chill pit, the steel foundry with drying oven and molding-sand dressing plant, and in a second room any machine tools required for working the castings and forgings.

Single-phase Induction Furnace

Induction furnaces are based on the production of high-current intensities, and accordingly high temperatures, by the induced effect of an alternating current traversing a primary transformer coil on the melting channel which forms the short-circuited secondary winding. The design of this type of induction furnace has been improved steadily in the course of the last few years.

The two single-phase furnaces of the Dommeldange plant are of the same type and construction. They are designed for an energy input of about 950 k.v.a. each, at 3500 volts and 25 cycles. For cooling the windings and the magnet iron of all the furnaces, there are two centrifugal fans, one of which serves as a spare. They are driven at 975 r.p.m. by 75-h.p. slip-ring induction motors supplied from the 500-volt three-phase system. These fans drive fresh air through a cleansing and filter compartment equipped with wool filters and a sheet-metal conduit, provided with locking gates, to the furnaces. The admission of air to the furnaces, which are of the tilting type, is effected through special telescoping tubes.



Dommeldange Electric Steel Plant

When the treatment of the charge is finished, the furnace is discharged by tilting in a forward direction with the aid of a three-phase 10-h.p. crane motor (500 volts and 710 r.p.m.) controlled from the furnace switchboard through the intermediary of a worm gear and pinion.

Special attention was paid to the tilting device. A differential belt brake operated by a braking magnet will stop the tilting gear automatically and nearly instantaneously as soon as the motor has been cut out. The maximum tilting angle in a forward direction is 45 deg., and in a backward direction (in slag discharging) 17 deg. from the horizontal. Self-acting switches prevent these extreme positions from being exceeded.

The furnace is built within substantial sheet iron, lined inside with fireproof material, surrounding the transformer cores with their windings and cooling sleeves. After lining with rammed magnesite (using a wooden model corresponding to the furnace shape) the drying and heating are effected by means of wrought-iron rings which, having been raised to a red heat by the primary current, will radiate heat to the lining.

The switching-in of the two alternating-current furnaces, the regulating of the furnace tension, or bath temperature, through remote control of the series exciter-current regulators and the checking of the voltage and current by means of special instruments mounted on two columns, are effected in a easy and simple manner from the switchboard of the furnace platform. Two controllers are used for switching-in the tilting motors.

The Three-phase Furnace

The transformer of the three-phase furnace which, in normal operation, absorbs 275 kw. with 70 per cent. power factor, at 500 volts and 50 cycles, consists of a three-legged core surrounded by primary and secondary coils. Owing to the position of the three legs in regard to the melting bath, a regular three-phase rotary field is produced, resulting in a rotation of the melting materials and a most effective mixing of the bath, tending to homogeneity of the final product. Three-pole plates are used to which the secondary windings are so connected that the interlinking point of the secondary currents is situated in the melting material of the central hearth, which in its turn serves as heating resistance. The slag is charged and discharged through one of the two rear doors, and the finished product is discharged in the same manner as in the single-phase furnaces.

The furnace tension, and accordingly the temperature of the melt, is controlled by an air-cooled, three-phase, regulating transformer, with a three-pole tap switch, giving six voltages. The tilting gear and mechanical part of the furnace corres-

pond to the design of the single-phase furnaces. The furnace switch cell contains the measuring transformers, fuses and oil switches controlled from the switchboard. The regulating transformer and tap switch are mounted beside the cell.

On the switching pedestal are mounted, in the same manner as with the single-phase furnaces, a switch column carrying an energy gage, a voltmeter and three ammeters, a hand-wheel for switching-in the furnace, two hand wheels for the remote control of the tap switch, and the controller of the tilting motor. A motor switchboard completes the equipment of the switch gear. A loud-speaking telephone plant provides means of prompt communication between the power house, converter station and furnace hall.

Satisfactory Results

The metallurgical results obtained at the Dommeldange furnace plant are extremely satisfactory. The best grades of steel, of absolutely homogeneous structure as well as in any kinds of ingots, are produced directly from liquid pig iron. In view of these results, extension of the plant has been planned, a third alternating-current furnace of 3½ tons capacity having been ordered. Meantime a tilting mixer of 15 to 20 tons capacity, constructed by Wellman, Leaver & Head, of London, has been put into commission so that previously purified material can now be used as furnace charge, the duration of the treatment being reduced from eight or ten hours to three or four hours, according to the final product desired.

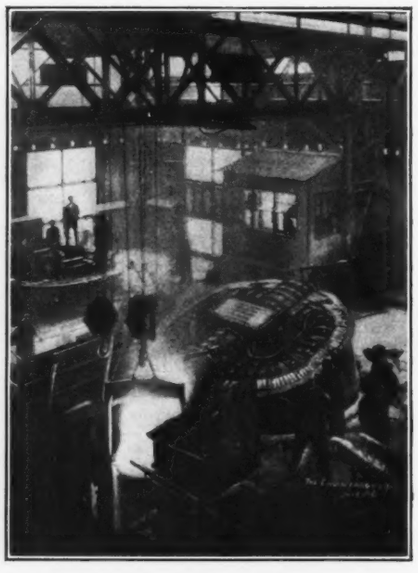
The electrical power required to work this plant is obtained from a generator driven by a double-acting waste-gas engine at the power house of the company's iron works at Dommeldange, Luxemburg. The generator is a three-phase machine of 1800-kw. effective output at 80 per cent. power factor, and delivers current at 5000 volts and 50 cycles, running at 94 r.p.m. A three-phase turbine-generator, consisting of a Zölly turbine designed for a steam pressure of 10 atmospheres and an 800-kw. (at 80 per cent. power factor) Siemens-Schuckert dynamo capable of generating 5000 volts at 50 cycles, running at 3000 r.p.m., is installed as a reserve. The electrical energy is transmitted from the power house to the converter station by an armored lead cable 375 m. in length.

Motor-generator Sets

Over-excited synchronous three-phase motors were adopted for driving the single-phase alternating-current generators, with a view to improving the power factor of the whole plant. Two of these motor-generator sets were installed at the converter station for supplying the single-phase furnaces. Each motor is rated at 715 h.p. and takes current at 5000 volts and 50 cycles; each single-phase alternator is rated at 825-950 k.v.a. and delivers current at 3000-3500 volts and 25 cycles. There are also a synchronous three-phase starting motor for intermittent operation, of 140 horsepower, built to take current at 500 volts and 50 cycles, and a direct-current exciter dynamo of 110 volts and 218 amp. capacity.

These motor-generators are operated at 375 r.p.m., the motor and generator having 16 and eight poles, respectively. Three pedestals bolted to the base plate with insulating sockets and provided with ring lubrication and water-cooled bearings, carry the continuous shaft of each set. The total weight of each set is about 50 tons.

In the engine room of the converter station is installed the switchgear,



Tapping an Electric Furnace

mounted on a switchboard made up of a simple and substantial wrought-iron frame with five white marble panels. One panel is provided for each of the two synchronous motors and generators. The two starting motors are connected to the 500-volt, three-phase system of the iron works and are switched off automatically, when a certain speed is attained, by means of centrifugal short-circuiting devices. The motors are controlled from the central panel of the switchboard, on which is also mounted a lever for actuating the oil switch of the three-phase furnace, with its ammeter.

Behind the switchboard are installed, in addition to the switch and measuring instrument connections, the exciter field regulators, the fuses for the starting motors, the switches connected with two centrifugal devices on the engine shafts, with their resistance; busbars for the 500-volt three-phase starting motors, and the 110-volt direct-current excitation circuit connections. Two change-over switches have been provided so that the exciting current can be obtained, if necessary, from the 110-volt direct-current system of the iron works. A comfortable passage with low wooden pedestal provides an easy access to all the connections behind the switchboard. On each panel are signal lamps to indicate that the switches are closed or open.

Influence of Impurities in Platinum Ware

That certain platinum ware is rapidly attacked by coal gas and some is not has long been known to chemists. A recent report of the Physikalisch-Technische Reichsanstalt deals with the causes of the difference[1]. Pure platinum foil was first tested against a 3½ per cent. iridium alloy. On heating pieces of foil 2x4 cm. in a current of coal gas, the pure platinum separated 14 mg. of carbon in one hour, 60 mg. in six hours; while the alloy separated 29 mg. in one hour and 410 mg. in six hours. This seems to indicate a necessity for the complete separation of iridium from platinum before making up the ware.

Another test on two pieces of platinum, which had been used under similar conditions, one of which had deteriorated rapidly, while the other had not, gave as the only ascertainable difference, 0.2 per cent. of rhodium in the bad sample, and 0.1 per cent. in the good. Further experiments are in progress to ascertain whether rhodium is the cause of the separation of carbon from some hydrocarbon gases with attendant flaking off of the platinum. The bad effect of iridium seems to be intensified by metallic oxides such as lime, magnesia or alumina.

Manganese Ore in Uruguay

In an article on the mineral resources of Uruguay, in *Bergwirtschaftliche Mitteilungen*, September, 1910, C. Guillemain describes the occurrence of workable deposits of manganese ore at Zapucay, near Corales, in the department of Rivera. The principal showings are in two ridges, Cerro Iman and Cerro Papageio. The original source of the ores is a quartz rock bedded among metamorphic slates, and charged with braunite and manganiferous hornblende. A few zones in the original rock consist of almost pure iron-manganese minerals, but the main body of that rock is silicious. Secondary deposits, however, are found nearby, containing ore of better quality. In order to develop them, it would be necessary to build a railroad of considerable length, or a canal, utilizing the rivers Negro, Uruguay and Takuarembo as means of transport. Deposits have been observed in other parts of the country, but no workable ones have yet been developed.

[1]*Chem. Trade Journ.*, Feb. 4, 1911.

Coal Mining Department

Labor Cost at French Coal Mines

In a recent report the Comité Central des Houillieres submits a table giving the cost of mine labor in France over a period of 20 years. The table gives the average daily wages of miners, and the average for all labor employed at coal mines; the average coal mined daily per miner, and for all labor; and the cost of labor per ton of coal hoisted. In the table we have reduced the French currency to dollars and cents. The figures of weight are in metric tons, and are given for five-year intervals only up to 1905; thence yearly:

	Av. Wages		Av. Mined		Cost per Ton
	Miners	All	Miners	All	
1890 ...	$0.882	$0.793	1.034	0.741	$1.084
1895 ...	0.872	0.791	1.031	0.720	1.098
1900 ...	0.986	0.899	1.009	0.721	1.247
1905 ...	0.953	0.874	0.997	0.710	1.231
1906 ...	1.007	0.917	0.988	0.698	1.315
1907 ...	1.038	0.946	0.971	0.695	1.361
1908 ...	1.050	0.957	0.939	0.674	1.420
1909 ...	1.054	0.959	0.938	0.669	1.428

In the 20 years the average daily wage of miners or underground men increased 17.2c., or 19.4 per cent.; of all employees, 16.6c., or 20.9 per cent. The average coal won per miner decreased 0.096 ton, or 9.3 per cent.; for all employees, 0.072 ton, or 9.7 per cent. In the same time the average labor cost per ton of coal increased 34.4c. or 31.7 per cent.

Restricted Rates on Coal

WASHINGTON CORRESPONDENCE

The Interstate Commerce Commission has handed down an important decision affecting the system of so called "restricted rates" on coal. In this decision the commission adheres to its ruling that "a tariff providing for reduced rates on coal used for steam purposes, or that the carrier will refund part of the regular tariff charges on presentation of evidence that the coal was so used, is improper and unlawful—that is to say, that the carrier has no right to attempt to dictate the uses to which commodities transported by it shall be put in order to enjoy a transportation rate."

The commission further sustains the view that "a carrier, or a person or corporation operating a railroad or other transportation line may not, as a shipper over the lines of another carrier, be given any preference in the application of tariff rates on interstate shipments, but it may lawfully and properly take advantage of legal tariff joint rates applying to a convenient junction or other point on its own line, provided such shipments are consigned through to such point from the point of origin and are, in good faith, sent to such billed destination."

Therefore the carriers are ordered to cease and desist from maintaining tariffs which contain rates applicable only upon shipments for a particular consignee or when the commodity transported is for a particular use, or rates that are restricted to the use of certain shippers and not open to all shippers alike.

The Important News Of Coal Mining. New Appliances, New Methods. New Fields, Colliery Engineering

Rebate of Duties on Coal

WASHINGTON CORRESPONDENCE

The following measure has been introduced in the Senate by Mr. Lodge and referred to the committee on finance:

That the Secretary of the Treasury be, and he is hereby, authorized and directed to make full rebate of all duties imposed by law on bituminous and culm coal imported into any port of the United States from foreign countries from Oct. 6, 1902, to Jan. 15, 1903, and to repay all moneys paid as duties upon bituminous and culm coal at any port of the United States to person, persons, or corporations who paid the same upon bituminous and culm coal imported from Oct. 6, 1902, to Jan. 15, 1903.

Labor in British Mines

According to advance sheets of the British Home Department's report for 1910, the total number of persons employed in 1910 under the Coal Mines Regulation Acts was 1,049,407. Under the changed conditions brought about by this act, there was an increase of coal-mine employees of 3.49 per cent., with an increased output of 0.20 per cent. Of the bove number, 848,381 were employed underground, and 201,026 above. The greatest proportion of under to above ground labor occurs in South Wales, 5.68 : 1. Under the Metalliferous Mines Regulation Acts, there were 28,589 men employed, 17,064 under and 11,525 above ground. Under the coal mines acts, the output per man (all laborers) was 170 tons per year, and under the metalliferous mines acts the output was 113 tons per year.

An Electric Lamp for Miners

The time is fast approaching when naked lights in coal mines will be absolutely abolished. A few years ago there were practically no safety-light mines in America; today there are a large number of mines using safety lights exclusively in all of their underground work. The chief objection to safety lights in mines is due almost entirely to the poor light these lamps give out. Acetylene lamps have met with much success in many mines, but they also are dangerous because of liability of igniting an explosive atmosphere.

The electric lamp shown in the accompanying illustration has been developed by the Pilley Manufacturing Company, 608 South Third street, St. Louis, Mo. The outfit consists of an electric lamp operated by an "armor-clad" storage battery carried on the belt, or in the pocket. The battery is no more trouble to carry than an ordinary oil canteen; the weight of battery, lamp and all complete, is about 2¾ lb. The battery is called "armor-clad" because it has an outside casing of sheet steel cemented to the inner casing of rubber, so that it is practically impossible to break the steel casing; if by accident the rubber cell should be cracked, the cement used prevents the acid from acting on the steel casing. One of the weakest parts of the ordinary pocket battery is the breaking out of the terminal where it projects through the rubber cell. This trouble has been overcome by the use of an insulating block on the top of the battery.

The battery is so constructed that it is only necessary to apply acid once a week, thus reducing the labor of recharging to a minimum. The lamps will maintain a bright light 14 to 15 hours. The battery should be recharged each day.

ARRANGEMENT FOR CHARGING

There is a unique arrangement for use in charging these batteries; it is so constructed that each miner has a particular place numbered on the charging rack to hang his battery, which also is numbered to correspond with the charging rack. The miners use their batteries in place of the checks ordinarily used to check in and out of the mine. In this way, the management can tell whether a man is at work or not by looking at the charging rack to see whether or not his battery is there. The electric current is left on the charging rack at all times, so that the

battery is being charged while hanging thereon; it is no more trouble for the miner to charge his battery than it is for him to hang up his check, as is the present custom. When the miner arrives in the morning his battery is ready for use.

The Cost of Charging

Two amperes at 250 volts will charge 90 batteries in 8 hours; therefore the cost of charging the battery does not exceed, counting acid, labor and power, over 25c. per month. Where these batteries are used in quantities, one man is designated to fill them with acid once a week; it requires about a tablespoonful of acid to each battery. This acid costs approximately 30c. a gallon. As to the cost of an oil light, it is safe to say that a gallon of oil at 60c., will last a miner from 7 to 10 days; therefore the cost of oil is at least 6c. per day.

Wet mines will not affect the lamp, as the body is made of aluminum and is waterproof. Furthermore, the body of the lamp is filled with a special composition, making it possible to use the light under water. Ordinarily, for miners use, there is no switch on the lamp to cut out the light, as it is understood that a miner wants a lamp to burn at all times while attached to the battery. However, for special service, such as reading gas meters, when it is desired to burn the lamp intermittently, a switch is placed on the back of the lamp so that the light can be turned off whenever desired. The manufacturers do not recommend putting a switch on these lights when the lamps are for use in mines, as any switch, no matter how simple, is certain to cause trouble when used by persons not experienced in the use of electricity. A reflector is furnished when required.

Safety Features

The voltage of the lamp being only two volts, it is claimed that there is no danger of any sparks at the time the contact is made or broken in any part of the device; as a consequence, it is said to be impossible to cause an explosion in a gas mixture. In recent tests, the globe used in the lamp was purposely broken in a body of gas, to ascertain if, when the globe breaks, it would ignite the gas; the results showed that the gas could not be ignited in that way.

The average estimated light of the bulb used in this lamp is from 200 to 300 hours, or in other words about the same as the average commercial incandescent lamp. The life of the battery is one or two years.

Showing Miner Equipped with Pilley Electric Lamp

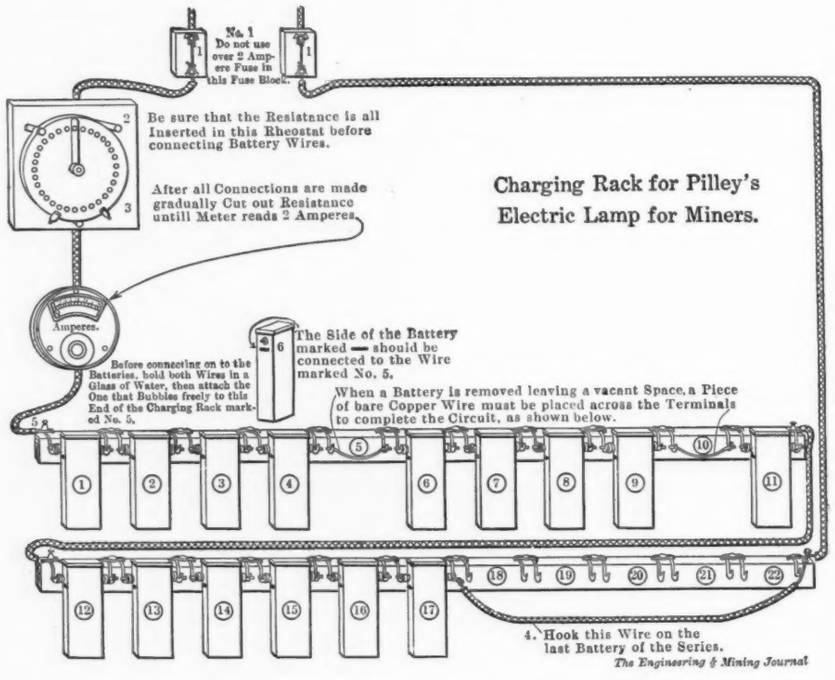

No. 1
Do not use over 2 Amp-ere Fuse in this Fuse Block.
Be sure that the Resistance is all Inserted in this Rheostat before connecting Battery Wires.
After all Connections are made gradually Cut out Resistance untill Meter reads 2 Amperes.
Charging Rack for Pilley's Electric Lamp for Miners.
Amperes.
The Side of the Battery marked — should be connected to the Wire marked No. 5.
Before connecting on to the Batteries, hold both Wires in a Glass of Water, then attach the One that Bubbles freely to this End of the Charging Rack marked No. 5.
When a Battery is removed leaving a vacant Space, a Piece of bare Copper Wire must be placed across the Terminals to complete the Circuit, as shown below.
4. Hook this Wire on the last Battery of the Series.
The Engineering & Mining Journal

Diagram Showing Arrangement of Charging Rack for Batteries

As shown by the accompanying cut, there is a hook by which the lamp can be attached to the cap the same as an oil lamp; when used this way, the rings, shown on the cable, can be attached to the back of cap and shirt, if desired, either with an ordinary safety pin or by stitching. However, experience has shown that the miners prefer to hook the lamp on their shirt front or other parts of their clothing.

Advantages Claimed

The advocates of this style of light claim numerous advantages: 1. No danger of igniting gas or possibility of an accident while handling powder. 2. The light cannot be blown out by a windy shot or gust of air. 3. They save much time that is lost in picking up and filling oil and carbide lamps. 4. There is no oil or dirt to grease the hands and clothes, which is a great advantage, especially to engineers and others who have to handle papers and instruments. 5. It costs less to use the lamp than it does to use an ordinary oil or carbide light. 6. The air in the mine will be clear and pure, and there will not be smoke and gas given off by carbide or oil lamps.

The fact that the light cannot be extinguished by a windy shot or other concussion is a distinct advantage, for many lives have been lost through miners being overcome by afterdamp while groping their way in a mine after their light has been blown out. Should the battery weaken, the light will not go out suddenly and leave one in the dark.

For several months these lamps have been used by a number of State and county mine inspectors, and lamp outfits have been placed at various mines for a sufficient length of time to test the efficiency and lasting power of the lamp and battery.

On April 11, the United States Steel Corporation started the byproduct coke ovens at Gary, built at a cost of $8,500,000 and requiring an operating force of 830 men. Coal was placed in the ovens and the next day the first coke and byproducts, such as ammonia and coal tar, were produced at the first battery of 17 ovens. There is a total of 56 ovens with an annual coke capacity of 2,500,000 tons. Besides the byproducts, gas to operate mills at Gary will be generated.

The Banner Mine Disaster

By Floyd W. Parsons

State inspectors disagree on cause of the explosion. One says powder, while the other inspector claims that the Alabama accident was due to an explosion of gas.

Mine inspectors Dickinson and Neill have submitted their reports of the recent explosion at the Banner mine, to the governor of Alabama. The two inspectors do not agree as to the cause of the explosion. Inspector Dickinson attributes the accident to an explosion of gas, while Inspector Neill says the initial cause was powder.

In the report of Inspector Dickinson, he says:

"The explosion commenced on the seventh left landing, on which are 24 rooms. At room 17 the explosive force split or divided, one part going out along the heading to the left slope, and the other going toward the face of the mine. Twenty feet on the inbye side (the side next the face) of room 17, was a powder house built of stone and cement, the size of which was 3 ft. by 10 ft. The house was built in a crosscut between the heading and the air course. It is claimed by the mine officials that 100 sticks of permissible powder (equal to 50 lb.) were taken into the powder house on this heading on the morning of the disaster, and in some manner became ignited, causing the explosion. I examined the place carefully, but failed to find any indication of any powder having been exploded, either there or elsewhere in the mine."

Inspector Dickinson then draws attention to the fact that if the powder had exploded there would have been an indentation in the floor of the room in which the explosion occurred.

"I am fully convinced," says Inspector Dickinson, "that the disaster was caused by gas being ignited in either room 12 or 14 on the seventh left heading, the same generating enough heat to ignite the dry dust with which it came in contact, thus propagating and feeding the force of the explosion."

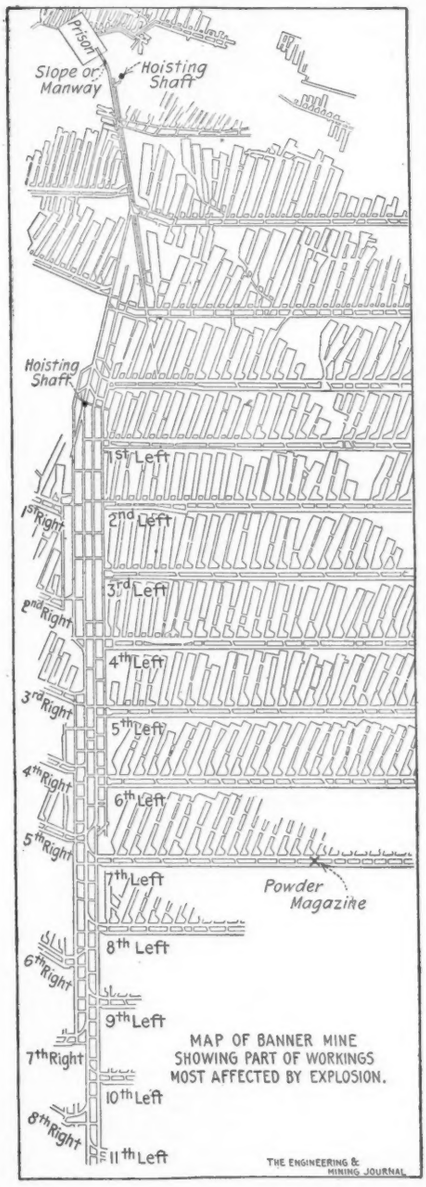
Neill's Report

The report of Inspector Neill says:

"This mine is operated by the Pratt Consolidated Coal Company and is situated in the extreme western part of Jefferson county, Alabama, about 20 miles from Birmingham and on the Cane Creek division of the Louisville & Nashville railroad.

"The mine is working on the 'big-seam,' and is 140 ft. deep. It gives employment to 285 men, of this 250 men are inside miners and 35 men work on the outside. It has a capacity of approximately 1100 tons of coal daily. The mine has three openings known respectively as 'the slope,' No. 1 shaft and No. 2 shaft.

"The ventilating apparatus at Banner mine consisted of two Crawford-McCrimmon centrifugal fans; one being 20 ft. in diameter and the other 17 ft. in diameter. The 17-ft. fan, which is located at No. 1 shaft, is used only in case of emergency. The 20-ft. fan is located at No. 2 shaft and furnished a quantity of air throughout the workings, ranging from 180,000 to 200,000 cu.ft. of air per min., thus each man had 800 cu.ft. of air per minute.



MAP OF BANNER MINE SHOWING PART OF WORKINGS MOST AFFECTED BY EXPLOSION.

Method of Mining

"The headings in this mine are driven 7 ft. high by 18 ft. wide, carrying with them a gob of 9 ft. by 5 ft., which leaves a sectional area of 75 to 85 ft. for haulage and ventilation. Heading air courses have the same sectional area as headings. The split system of ventilation is used throughout. All overcasts were built of concrete; the side walls being 2 ft. in thickness and the arch from 6 to 8 in. in thickness. All brattices were built of stone and cement 18 in. in thickness.

"In this mine all coal was undercut by electric machines before blasting was done. It was the custom for a free man to have under his charge three or four convicts. This man had control of two working places. This was done in order to allow him to load in one place, while the machines were undercutting in the other. The blasting was done by shotfirers, each heading having a separate shotfirer and such work being done during the day while the miners were in the mine. Explosive used was bituminite No. 1, a permissible explosive passed by the United States Bureau of Mines. This explosive was carried into the mine daily in quantities to do that day's work. This was not kept together, but each entry was apportioned the amount necessary for that day's work and stored therein.

Method of Moistening Dust

"As is the case in all machine mines, more dust is made than by the old method of hand mining. While these machines are in operation the atmosphere is dense with coal dust in the immediate neighborhood, and to meet this condition it is necessary that steps be taken to keep this dust moist and to send it out of the mine. All the dust made by the machines, which is not in suspension, is then loaded into cars and sent out of the mine before any blasting is done in the particular place where the machine is at work. The moistening method adopted by the Pratt Consolidated Coal Company in its Banner mine consists of 96 sprays which are distributed throughout the mine at intervals of 100 ft. apart, and each delivering 30 gal. of water per hour in the form of moisture or water vapor. The system of haulage in use in this mine is electric locomotives and mules.

"On April 8 at 6:35 a.m. an explosion occurred in the foregoing described mines in which 128 men lost their lives as a direct result thereof.

"The above total does not represent the total number of men in the mine at the time of explosion, as about 50 men escaped before the afterdamp had

reached them. The machine men and their helpers and their bosses had not yet entered the mine for work, with the exception of O. W Spradling, an under foreman, and Lee Jones, the shot firer (both free white men) who were in the mines and were killed.

"Saturday, April 15, I spent the day in Banner mine, making an investigation as to the cause of the explosion, and arrived at the following conclusons:

"Commencing at the face of the slope we entered the twelfth left, which is 81 ft. in ; a slight disturbance, with no heat, was shown at this point.

"The tenth left, which is 342 ft. was next examined; heat was shown at this point, but the disturbance was slight. Sixty sticks of bituminite, one hundred (100) detonators, 10 clay dummies and 100 ft. of fuse were found at No. 1 room of the tenth left heading.

"The ninth left entry was next examined. The force of the explosion was shown as traveling up this entry. One hundred pounds of No. 1 bituminite, 250 ft. of fuse, three rolls of paper and six cartridges made up ready for use were found at the end of the side tracks which was the greatest force shown on the entry. A slight cap of gas was found in the heading on the airway in this entry.

"The eighth left entry was next examined, passing up the airway at the last crosscut in this entry; much heat was shown and much coke shown on props. In a box between the sixth and seventh rooms, 75 sticks of bituminite were found. No gas was found in this entry.

Conditions on Seventh Left Entry

"The seventh left entry was then entered by way of the aircourse; much disturbance was shown in this entry. Between Nos. 14 and 15 rooms a box was found containing four sticks of bituminite, 22 ft. of fuse, four rolls paper and two dozen detonators. Twenty-one feet inside of No. 17 room, a magazine had been used for the storage of explosives for that day's work in that particular entry. This magazine entry and aircourse had inner and outer wall built of stone and cement. The outer wall had a door 4 ft. by 2½ ft. to allow for passage into and out of magazine. According to a statement of the mine officials 160 sticks of bituminite should have been found at this point, 40 sticks left over from previous shift, 20 shots made up ready for use and 100 sticks supposedly carried down by shot firer. One of the shot firers for this entry was found in the near neighborhood of this magazine. There was much force shown on the heading road, as continuous falls of rock and coal were encountered in passing out of this entry. Indications of much heat was shown at the face of all working rooms on this heading. Room Nos. 9, 10 and 11 were being prepared to bring back the top coal (the coal above parting previously left as a roof, which is taken down after room has been worked up to its limit). This entry shows the effects of a greater amount of explosive force than any other entry.

"The fifth right entry was examined, together with all the working rooms on it. Evidence of heat was shown by the coke on the room props. Evidence of much disturbance was shown also in this entry. On the entry road near No. 8 room, 27 sticks of bituminite and 100 ft. of fuse were found. The magazine in this entry is located near No. 9 room. We here found 25½ sticks bituminite, three shots ready for firing, together with a box containing 50 detonators.

Conclusion

"After having made a thorough examination of all parts of the mine affected by this explosion, and with the evidence furnished, I have arrived at the following conclusion as to its origin and cause: The explosion originated by a premature explosion of bituminite at the magazine located in the crosscut between entry and air course about 21 ft. inside of room No. 17 on the seventh left heading. I am led to this conclusion because of the fact that the force of the explosion divided itself here, traveling in the direction of the heading face and also in the opposite direction toward the slope. Further evidence shows that 120 sticks of bituminite were missing at the magazine, and the man, who carried 100 sticks down that morning was found badly multiliated at that point. There may be theories as to how the bituminite exploded, but the fact remains that it did explode, as it was not found at or near the magazine.

"The mine, as before stated, is ventilated on the split-current system. The overcasts and brattices are made of stone and cement. No doors are used in the ventilating system, thus making it impossible to impair the ventilation at any part of the mine by leaving doors open, which would permit the air to short circuit. As long as the ventilating fan was kept in operation the ventilation could not be impaired, and the automatic fan recorder which accompanies this report shows the fans to have been in operation regularly and continuously up until the minute of the explosion.

"The force of the explosion up to the air shaft did not show any evidence of heat as no scorchings are found on the shaft timbers. This was not the case at Virginia, Mulga and Palos. At each of these places flames shot out of the mine and the explosive gas was found in large quantities when recovering the dead bodies. The Banner mine generated some gas but not in large quantities; as shown by the daily report of the fire bosses, little gas has been found at any time. Since the explosion, with impaired ventilation and after the lapse of 10 days no gas beyond a cap has been found, which shows how difficult it would be for gas to accumulate under normal conditions.

Prison and Stockade at the Banner Mine

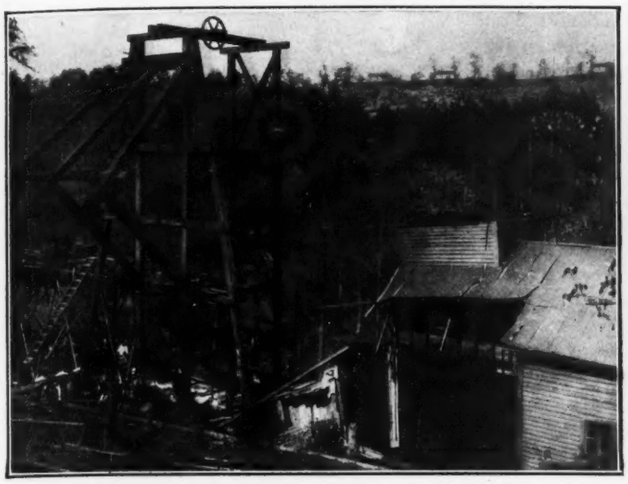
"The evidence as shown by coke deposited on timbers, cars, walls, etc., leads me to the conclusion that the premature explosion of the bituminite occurring in the magazines in the seventh left entry, aided by dust, was the direct cause of the disaster.

Cause of Explosion in Doubt

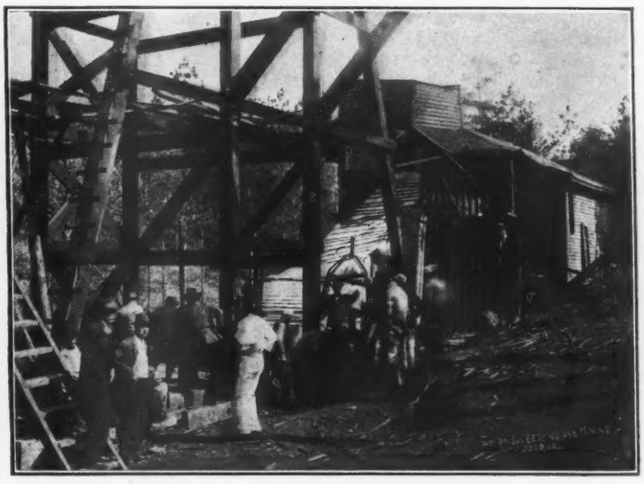
As is generally the case in mine disasters, the above reports indicate that the cause of the Banner explosion will remain in doubt. The company officials will probably agree with Inspector Neill, because his theory places less blame on the management. When damages are sought, it makes a lot of difference whether the fatalities are due to the careless handling of powder by a miner, or to the ignition of accumulated gas due to poor ventilation. It seems, however, that Inspector Neill has made out the better case, and more weight will attach to his opinion.

The chief criticism is that quantities of explosives, far in excess of a day's work were kept underground. These explosives were handled in a too free or unrestricted manner. One other criticism that applies to practically all mines in Alabama, is the practice of driving such wide (18 ft.) entries, and then gobbing about 9 ft. of the space with waste rock. This plan reduces cost of mining, but increases danger through affording a convenient and exposed receptacle for dust.

The death knell of mine explosions in this country is already tolling. A few more disasters and the funeral will take place. The solution is in the minds of many people. Some do not want to recognize what they see approaching, and are trying to look askance. However, it is surely better to have a say in something that vitally concerns you, than to permit others, unfamiliar with your case, to complete all the arrangements. Furthermore it is only fair, and absolutely essential that the public pays part of the freight.



SHAFT AND FAN HOUSE IMMEDIATELY AFTER THE ACCIDENT



RESCUERS PREPARING TO LOWER CAGE OR BUCKET

SHOWING ENTRANCE TO MANWAY OR SLOPE INSIDE THE STOCKADE AT THE BANNER MINE. CONVICTS ARE CARRYING BODIES FROM THE MINE

NEW PUBLICATIONS

IOWA GEOLOGICAL SURVEY, ANNUAL REPORT, 1909. Pp. 542. Iowa Geological Survey, Des Moines.

THE MINERALOGY OF ARIZONA. By F. N. Guild. 5x6¾, pp. 103; $1. Chemical Publishing Company, Easton, Penn.

VERRINGERUNG DER SELBSTKOSTEN IN ADJUSTAGEN UND LAGERN VON STABEISENWALZWERKEN. By T. Klőnne. 5 marks. Julius Springer, Berlin.

THE BADLAND FORMATIONS OF THE BLACK HILLS REGION. By Cleophas C. O'Harra. Pp. 144. Bull, No. 9, South Dakota School of Mines, Rapid City, S. D.

MINERAL RESOURCES OF TENNESSEE IN 1910. By R. A. Shiflett. Pp. 57. Nineteenth Annual Report of the Mining Department of Tennessee, Nashville.

THE JOURNAL OF THE IRON AND STEEL INSTITUTE, Vol. LXXXII, No. II, 1910. Edited by George C. Lloyd. 5¾x8½, pp. 601. E. & F. N. Spon, Ltd., London.

GEOLOGY OF THE NIPIGON BASIN, Ontario. By Alfred W. G. Wilson. 6½x10, pp. 152, paper. Memoir No. 1, Canada Department of Mines, Ottawa, Ontario.

GEOLOGY OF THE PEGMATITES AND ASSOCIATED ROCKS OF MAINE, INCLUDING FELDSPAR, QUARTZ, MICA AND GEM DEPOSITS. By Edson S. Bastin. Pp., 152. *Bull.* 445, U. S. Geological Survey, Washingotn.

OIL RESOURCES OF ILLINOIS, WITH SPECIAL REFERENCE TO THE AREA OUTSIDE OF THE SOUTHEASTERN FIELDS. By Raymond S. Blatchley. Pp. 138. From *Bull.* No. 16, State Geological Survey of Illinois, Urbana.

THE IRWIN RIVER COALFIELD, AND THE ADJACENT DISTRICTS FROM ARRINO TO NORTHAMPTON. By W. D. Campbell. 5½x8½, pp. 108. Bull. No. 38, Western Australia Geological Survey, Perth, Western Australia.

LA GRANODIORITA DE CONCEPCION DEL ORO EN EL ESTADO DE ZACATECAS Y SUS FORMACIONES DE CONTACTO. By Alfred Bergeat. 9x12½; pp. 109; 9 plates, paper. Bull. No. 27, Instituto Geologico de Mexico, City of Mexico.

TITANIUM IN STEEL AND IRON AND TITANIUM ALLOYS. 4½x5½, pp. 12, paper. George G. Blackwell Sons & Co., Ltd., Liverpool, Eng.

This is one of a series of pamphlets issued by George G. Blackwell Sons & Co., and deals with the increased wear given rails by the addition of ferro-titanium to the mixture. Others in the same series likely to interest the mining and metallurgical world are: Low-carbon ferro-chromium; anti-friction metals; magnesite, chrome and other refractory materials; and fluorspar.

ILLINOIS STATE GEOLOGICAL SURVEY, BULL. NO. 16. YEAR BOOK FOR 1909. By Frank W. DeWolf, director. Pp. 402. Urban, Ill.

Contents: Administrative report for 1909, by F. W. DeWolf; Elizabeth sheet of the lead and zinc district, by G. H. Cox; oil resources of Illinois, by R. S. Blatchley; studies of Illinois coal; faunal succession and correlation of the pre-Devonian formations of southern Illinois, by T. E. Savage; the occurrence of structural materials in Illinois, by Jon Udden and J. E. Todd.

THE SCIENTIFIC AMERICAN CYCLOPEDIA OF FORMULAS. Edited by Albert A. Hopkins. 6x9, pp. 1077. $5. Munn & Co., New York.

Contents: Accidents and emergencies; agriculture; alloys and amalgams; art and artists' materials; beverages, alcoholic and non-alcoholic; cleansing, bleaching, renovating and protecting; coloring of metals, bronzing, etc.; dyeing, electrometallurgy and coating of metals, glass; heat treatment of metals; household formulas; ice cream and confectionery; insecticides and extermination of vermin; lapidary art; leather; lubricants; paints, varnishes; photography; preserving, canning, pickling; rubber, gutta-percha; celluloid; soaps and candles; soldering; toilet preparations; waterproofing and fireproofing; miscellaneous formulas, chemical manipulation, weights and measures.

AMERICAN RED CROSS ABRIDGED TEXTBOOK ON FIRST AID. Industrial Edition. By M. C. Lynch and M. J. Shields. 4x5½, pp. 175, paper; 30c.; P. Blakiston's Son & Co., Philadelphia.

The object of this book is to provide elementary instruction in first aid in a form accessible to everyone. It has been shown that in certain mines in Pennsylvania where first aid is known by all the workmen that sick and death benefits have been reduced to one-half their former figure. With so great direct results produced by first aid, one can hardly recommend too highly anything which will diffuse a working knowledge of it more widely. A general distribution of this book by corporations to the foremen and subforemen would appear to be a wise precaution, especially in mining regions.

GUIA MINERA PARA INGENIEROS Y PRACTICOS. By Ferdinand McCann.

This book, following the scope and style of the numerous valuable handbooks in English for technical use, is a useful and needed addition to technical literature in Spanish. It contains complete and convenient conversion tables in addition to the standard tables for engineers, and new and needed value tables for copper, silver and gold. There is in the book a list of Mexican mineral localities and the Mexican mining law and postal regulations. A good map of Mexico is included. Mr. McCann, who is an American engineer of long experience in Mexico, has reared a lasting monument to his industry and to his public-spirited interest in the progress of the Mexican mining industry. He is also author of another book in Spanish issued in 1909, "Beneficio de Metales de Plata y Oro por Cianuracion."

CHRYSOTILE ASBESTOS. ITS OCCURRENCE, EXPLOITATION, MILLING AND USES. By Fritz Cirkel. Second Edition, enlarged. Pp. 316, paper, illustrated. Canadian Department of Mines, Mines Branch. Government Printing Bureau, Ottawa.

The advance of the asbestos industry during the last few years has increased interest in the subject, and the first (1905) edition of the monograph by Fritz Cirkel on asbestos, has been exhausted, and this more comprehensive edition is now issued to supply the demand for information. In 1904 the Canadian output of asbestos amounted to 35,479 tons, whereas in 1909 it was 63,349 tons valued at $2,284,857. The increase is confined exclusively to mill fiber, the production of crude being today about the same as it was eight years ago. The asbestos industry has taken on an altogether different aspect since the introduction about 14 years ago of mechanical separation, which has enabled the operator to extract small fiber from the rock. Dealing with the future of the Canadian supply the writer states that the Quebec productive area is small as compared with the whole serpentine belt. But personal investigation enables him to state that in one of the Black Lake quarries there were 44,377,500 tons of asbestos rock in sight above the railway track, ready for immediate exploitation. Deducting 50 per cent. from this for waste rock it means that there were in sight 22,000,000 tons of asbestos mill rock. Much speculation is being manifested with regard to the depth of the asbestos deposits. Excepting in the case of one of the chrome iron-ore mines, where asbestos was encountered at a depth of 400 ft., there is no tangible evidence of the presence of asbestos below a depth of 200 ft., the lowest level so far attained in one of the older quarries. A new feature in the present edition which adds greatly to the interest and value of the work is the reproduction of a number of photomicrographs and drawings showing the fiber structure, etc., of chrysotile-asbestos in its varied forms, and the numerous photo-engravings of deposits and plants are also new.

PERSONAL

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

J. Parke Channing has returned to New York.

L. F. Shaw has returned to New York from London.

George E. Farrish has returned to New York from a trip to Alaska and California.

E. Putnam, of Parral, Chihuahua, Mexico, is visiting New York and Boston.

Captain Hogan has resigned his position as superintendent of the Giroux copper mines, Ely, Nevada.

W. L. Fleming has taken charge of the engineering department of Baruch & Co., 20 Broad street, New York.

J. R. Finlay has returned to New York and has opened an office as consulting engineer at 52 William street.

F. F. Sharpless left New York last week for British Columbia, where he will look over several mining camps.

W. R. Layne has been appointed general manager of the Muchacho Grande mine, near Alamos, Sonora, Mexico.

C. Colcock Jones has returned to Los Angeles, Cal., from making some mine examinations near Nogales, Arizona.

James B. Gallagher, of Birmingham, Ala., has been chosen president of the new Gallagher Coal Mining Company.

R. H. Lyman, of Mexico City, is in New York, on his way to Cobalt, Ont., where he will investigate some mines.

Jesse J. MacDonald left Los Angeles, Cal., April 25, on an extended professional visit to the new oilfields of San Juan, Utah.

Henry M. Ralston, of Chicago, who is largely interested in mining in Arizona and Minnesota, has been in New York on business.

John D. Ryan has been chosen president of the United Metals Selling Company, New York, in place of Adolph Lewisohn, resigned.

J. R. Thoenen has removed from Creighton Mine to Crean Hill, Ont., having been appointed superintendent of the Crean Hill mine.

J. M. Callow has been appointed consulting mill engineer for the Inspiration Copper Company, with C. H. Repath as constructing engineer.

Desaix B. Myers left Los Angeles, Cal., April 26, for Chloride, Arizona, where he will be engaged in mine examination work for about a month.

John Reis has been chosen a vice-president and Ward B. Perley assistant to the president of the United States Steel Corporation. Mr. Reis has had many years of practical experience in steel manufacture.

William J. Gebhardt, for some years past with the Luhrig Coal Mining and Washing Company, has resigned and taken a position with the Beech Creek Coal Company.

James S. Cunningham, for several years superintendent of the Windber mines of the Berwind-White Coal Mining Company, is acting as special agent for E. J. Berwind, of New York.

F. A. Halsey has resigned as editor of the *American Machinist*. He will continue with the paper in a consulting capacity, with the title of editor emeritus. L. P. Alford succeeds him as editor of the *Machinist*.

The assistants to C. H. Nesbitt, the new chief mine inspector of Alabama, are: J. E. Webb, Quinton; Frank Hillman, America; W. R. Ray, Blocton; Thomas Roscoe, Birmingham; David Kelson, Wylam; W. W. Kicker, Maben.

R. L. Daugherty, of Lead, on April 1 assumed the duties of State mine inspector of South Dakota, succeeding N. Treweek. Mr. Daugherty was employed in the Homestake mine and has had experience at other mines in the Black Hills.

Daniel G. Davis, a mine foreman for the Delaware, Lackawanna & Western company, has been placed in charge of the Government mine-rescue car, stationed at Kingston, Penn. He takes the place of Joseph Evans, who was killed in the Pancoast accident.

The new chief State mine inspector, Charles H. Nesbitt, and the six assistants, have divided up the work and are now making daily inspections of mines in Alabama. It is proposed to carry out every letter of the new laws adopted in Alabama. No hardships will be imposed, it is asserted, on either the operators or the miners.

W. H. Landers has resigned as superintendent of the Standard Consolidated Mining Company, Bodie, Mono county, Cal., and will be succeeded by J. R. Buchanan, the present assistant superintendent. Mr. Landers will devote most of his time to opening up the Reward mine near Independence, Cal., in which he is interested with A. J. McCone.

OBITUARY

J. E. Johnson, Sr., manager of the Longdale Furnace Company, Longdale, Va., died May 1. We hope to publish a suitable notice later.

A life of the late Mrs. Richards is to be written with the approval of Professor Richards. It is hoped that the story of her life may be of such a character that it will not only interest those who have known Mrs. Richards either personally or through her work, but will also serve to extend her influence and to inspire future workers. Any material—letters, photographs, characteristic sayings and incidents, which will help to show her personality and her far-reaching interests and activities will be very valuable to the editor, Miss Caroline L. Hunt, and should be sent to her at 32 Eliot street, Jamaica Plain, Mass.

Samuel Calvin, died at Iowa City, April 17, aged 71 years. He was born in Wigtonshire, Scotland, and removed to Iowa when but a boy. He is best known for his work as a professor in the State University of Iowa and as State geologist. The comprehensive reports on Iowa geology made by the present Survey have all been written under his supervision and the present advanced state of knowledge regarding the mineral resources of that State is largely due to his energy and ability. He was a man of high ideals and singularly lovable character who devoted himself unselfishly to his profession. He leaves a record of clean, honest work, and of distinguished service.

SOCIETIES and TECHNICAL SCHOOLS

American Society of Mechanical Engineers—Among the topics for discussion at the meeting in Pittsburg, May 30, will be the application of mechanical engineering to the field of cement manufacture; steel works practice; hydraulic forging presses and blowing engines; and the purchase of coal on the heat-unit basis.

Lake Superior Mining Institute—It has been stated that there is a possibility the Institute would hold its annual meeting this year in some locality remote from these ranges, invitations having been extended by Spokane and Detroit. As arranged originally, however, the convention will take place on the Menominee range.

International Railway Fuel Association—The third annual meeting will be held at Chattanooga, Tenn., May 15-18. The program will be interesting to coal-operators as well as to railroad men. The following papers will be read and discussed:

"Fuel Investigations Under the Bureau of Mines." Dr. J. A. Holmes, director Bureau of Mines.

"How to Organize a Railway Fuel Department and Its Relations to Other Departments." T. Duff Smith, fuel agents, Grand Trunk Pacific.

"The Testing of Locomotive Fuel." F. O. Bunnell, engineer of tests, Rock Island Lines.

"Some Results of Buying Coal Upon a Mine-Run Basis." A. A. Steel, professor of Mining, University of Arkansas.

"The Railway Fuel Problem in Relation to Railway Operation." R. Emerson, engineer track economics, Atchison, Topeka & Santa Fé.

"Petroleum: Its Origin, Production and Use as Locomotive Fuel." E. McAuliffe, general fuel agent, 'Frisco Lines.

Editorial Correspondence

Reports from our own Representatives on Important Events from Many Important Mining Centers of the World

Denver

May 1—It is hoped that the mining industry in Colorado will be revived if the plan for the promotion of mining is followed as outlined by the department of mining, under the board of immigration, in conjunction with the committee on mines and mining of the Colorado chapter of American Mining Congress, which will establish a system of filing mining property for lease or sale. This will be the means of bringing capitalists who are desirous of leasing or buying mining property together.

It will be the purpose of this department to keep a record of all mining property of the State on file, and anyone desiring to lease or buy the land will be given a description of the property and then he can make his own investigations. There will be no chance for graft, as there will be no charge either to the lessor or owner or investor, who desires to be put in touch with the mining land of the State.

Salt Lake City

April 29—The first two remodeled sections of the Arthur mill of the Utah Copper have been placed in commission, and it is expected to have the third section in shape during May. The Magna mill is not being crowded at present, and a few minor changes are being made. On account of the increased capacity, larger motors will be added in some places and the old motors sent over to the other mill. The old Copperton plant has been dismantled, during the past six weeks, and the buildings torn down, the only one which remains being a small power house containing a compressor, which furnished air for drilling in the tunnels on the Bingham & Garfield railway. The last of the tunnels broke through April 22. The new road is 17 miles long, and reduces the present haul about 10 miles. The freight rate is now 1c. per ton-mile, and amounts to 27 or 27½c. Track has been laid with 90-lb. rail from Garfield to the site of the old Copperton mill, a distance of about 15 miles, which largely completes the road except on the region between Dry fork and the mine. Grading on this part is nearly finished, but awaits the completion of the bridges over Dry fork and Markham gulch. The large trestle over Carr fork, 196 ft. above the wagon road, was nearly enough completed April 15 so that the first train, carrying steel for the Markham Gulch trestle, was sent across. Unless something unforseen occurs, the road should be far enough completed for trains to run over it inside of three months, and it is expected to be open for traffic before the end of the summer.

Houghton, Mich.

April 22—The Lake district is commencing to feel acutely the stagnant condition of the copper market and the result is extending to all other lines of business. Since Jan. 1, as the reports of various companies have been issued from time to time, the true condition of affairs as regards a number of the companies has become more and more apparent, with a consequent realization of the difficulty of conducting exploratory operations. But it is worth noticing that even some of the dividend payers were unable to meet dividend requirements out of the earnings on production. The result of all this points toward two things—a discontinuance of operation in the case of non-dividend payers, and a cut in the dividend rate in the case of dividend payers.

Although it is not generally realized here, probably the most favorable factor in the situation is the proposed actual closing down of some of the properties.

Indianapolis

May 1—The miners' examining boards, created by the new law and appointed in each of the mining counties of the State, begin holding daily sessions today to issue certificates to miners. It had been supposed that only persons who applied for work as miners after the law went into effect would have to get certificates, but attorneys hold that each of the 17,000 or more miners of the State would have to get a certificate. Those who have been at work two years or more need not take the examination, but they must get a certificate from the examining board. Those who take the examination must answer 15 questions, the answers to which will be regarded as bearing on their qualification to work in the mines of the State. The board can sit only 10 days a month and it is now believed that it will be a physical impossibility for all the miners in some of the counties to go before the board inside the limited time. One surprising construction of the new law is that all must pay a $1 fee for the certificate, including the old-timers who are not required to take the examination. This requirement is meeting with opposition by the miners, who say they were misinformed relative to this provision of the bill.

Birmingham, Ala.

May 1—Work has been resumed on the new plant of the American Steel and Wire Company at Corey, the new industrial town in the Birmingham district, after a week's shutdown. Judge Gary, of the Steel Corporation, announced that there was a misunderstanding to instructions as to the stopping of work on the big plant, and that it was not intended to influence Congressman Oscar W. Underwood, of Birmingham district, or any legislation whatever.

Reports are current that the negotiations looking to the merger between the Alabama Consolidated Coal and Iron Company and the Southern Iron and Steel Company are soon to be completed and that announcements of a reorganization of the merged concern will soon be made.

Cobalt

May 1—As reflected by last week's shipments, power conditions in Cobalt are again becoming normal, and the two big companies are now in a position to supply all the compressed air required. From now on the rate of production will show a material increase, as the different properties have been severly handicapped for power.

El Paso, Texas

April 29—The continued tie-up, owing to the revolutionary troubles, of the Mexican railroads running into El Paso, is making itself felt locally. For three months no ore has been received at the local plant of the American Smelting and Refining Company, and when it is remembered that the principal supply of lead-silver ores for El Paso originate in the state of Chihuahua, along the Mexican Central and the Pearson railroads, and both of these roads being put out of commission, it is nothing short of remarkable that the smeltery is operating at all. However, two lead furnaces and two copper furnaces are kept in operation, handling between 800 and 1000 tons daily; six lead furnaces are cold. The copper furnaces are kept running on ores from New Mexico and Arizona principally. Owing to the foresight of the management, and new construction work in the way of installing new copper furnaces preparatory to handling the product from the Chino Copper Company and other large pro-

ducers, no reduction in the laboring force has been made, and 700 to 800 men are steadily employed. This means the distribution of a monthly payroll of approximately $40,000.

How long before the smeltery will be forced to close down the two lead furnaces now operating is problematical, and largely depends upon how soon the Mexican railroads will be allowed to repair their tracks and run their trains. New Mexico and Arizona combined do not produce enough lead ore to supply even one furnace for any length of time, and the ore must come from Mexico.

El Paso is suffering more in a business way than any other city on this side of the border; probably more than 50 per cent. of the trade of the large wholesale houses, commission firms and machinery houses is with Mexico, which is completely cut off at the present time, and many others interests are suffering.

Mining conditions in other districts tributary to El Paso, outside of Mexico, are good; Santa Rita, Hanover and Silver City districts are busy, and the Mogollon district is rapidly becoming an important gold-producing camp; the above camps are in Grant and Socorro counties, New Mexico.

Important negotiations are now under way which, when completed, will mean the development on a large scale of the Organ district, 16 miles east of Las Cruces, N. M. It would not be surprising if this would be the next large copper district to come to the front in the southwest.

Some development is being done in the gold-silver districts in the Black range, Sierra county, New Mexico; for some reason capital has been slow to go in there, but this field has every feature of becoming as productive, with equally as much development, as the Mogollon district. The occurrence, extent and value of the orebodies are similar, and natural conditions for economic mining and milling is, if anything, in favor of the Black Range district.

The failure of the new mining law to pass the Texas State legislature kept many from engaging in exploration work in western Texas. Several interests are ready and anxious to explore the mineralized sections in this State, if an equitable law were passed governing mineral rights. Such a measure will probably be passed during the next session of the Legislature.

Chihuahua

April 24—Mining conditions throughout Chihuahua have shown some improvement during the last two weeks, owing to more regular traffic on the lines of the National Railways, the assembling of insurrectos at less important mining points and more especially from the peace negotiations under way. The railroad service between here and Torreon has been interrupted for only a couple of days and regular passenger and freight traffic on the Mexico Northwestern line west was resumed on April 21, so that the shortage of food and supplies in Sierra camps has been somewhat relieved and some ore shipments have been received at Chihuahua. Train service on the Parral-Rosario branch from Jiminez on the National line has been indefinitely discontinued west of Santa Barbara, while traffic is irregular on the Parral & Durango railway owing to the activity of the rebels.

The Chihuahua smeltery has been operating at full capacity and is receiving plenty of ore as well as coal and coke to insure uninterrupted operations. The Santa Eulalia mines are supplying a normal tonnage and silica ores are being received in sufficient quantity from the south.

About the middle of April payrolls amounting to about 9000 pesos for the Santa Eulalia mines were robbed on the Mineral railroad and to preclude a similar occurrence the companies are now bringing their men to Chihuahua twice per month where they are paid. The Santa Eulalia camp is quiet but there is a scarcity of first-class miners. A normal production has been made this month, considering the almost complete shut-down customary for several days during holy week. Considerable development has, of course, been retarded, but this will be resumed as soon as conditions are more settled.

There has been no late shut-down of producing mines in the western part of the state, and while bullion and ore shipments have been inconsiderable the actual production has been but little curtailed. Now that regular service has been resumed on the Mexico Northwestern line the accumulated bullion, as well as ore and concentrates, will be moved and the output will be recorded as usual.

Since Jan. 1 it is estimated that the falling off in production in the state has been about 25 per cent., and this mainly from the bullion-producing properties in the Sierras. Santa Eulalia has maintained a steady output, while the Parral camp has shown an increased tonnage owing to the operation of the new cyanide plants. The Terrazas output has been nil, with the exception of small shipments of lead ore by wagon to the Chihuahua smeltery. Zinc-ore shipments have amounted to almost nothing, but this is probably due as much to its unsatisfactory marketing as to the revolutionary disturbances. In any event the mining and development of the ore at heretofore productive mines have been practically suspended.

There has been no output from the mines tributary to the National and Northwestern lines in the northern part of the state owing to interrupted traffic, and a serious blow has been given the industry in a number of instances owing to the fact that several properties had just reached or were attaining a producing basis.

With peace in sight, plans are under way for operations on a larger scale at many properties and a number of new producers will be noted, such as the Rio Tinto Mining and Smelting Company with mines and smeltery at Terrazas, the Concheño Mining Company with cyanide plant near Ocampo, the Rosario mine in the Guadalupe y Calvo section, San Francisco del Oro Mining Company at Parral, as well as numerous smaller properties.

Mexico City

April 27—The mining, as well as the smelting situation in Mexico is bad, without doubt, and although I think that the present trouble will terminate in one way or another within 30 days, the effect, especially to the mining and smelting industries, will be felt for a considerable period. From my point of view, after gathering information on all sides, and from the "inside," the present government is absolutely unable to sustain its position, and a radical change is to be expected. I doubt not, but it will be one of the greatest causes for such progress as Mexico has never seen, but in the meantime the great damage done to the entire railroad system, business, planting and the subsequent lack of corps, will make times hard for a year or two. Of course, mining, being the most speculative among the enterprises, is the first one to suffer and will be the last one to recover. On the other hand it will be, in my opinion, the last opportunity to procure properties of all kinds cheap, as everybody is more or less demoralized, except the few of us who have faith and a little something with which to support our faith in the meantime.

Another result is to be expected, that is, as the government is now paying from one to two pesos per day to its soldiers, the time of the cheap laborer will soon be over, as no miner will work himself to death in a mine for one peso per day when he can live comparatively in luxury and leisure and receive twice that sum. This will be a factor worth taking into consideration in the future. As far as Americans and American interests in this country are concerned, I think they will be fairly treated, and if possible a little better, but no one should have any illusions, because the anti-American feeling still exists and will continue, notwithstanding all fervid protestations to the contrary. I am of the opinion that this feeling is partly due to some of the early and latter-day Americans' habit of "butting in." The revolutionists have treated the people and especially the foreigners with every consideration, even better in instances than the federal troops. It has been the most gentlemanly revolution I have ever heard or read about.

The Mining News

Reports of New Enterprises. New Machinery. Installations. Development Work and Property Transfers. The Current History of Mining

Arizona

GILA COUNTY

Miami—The plant is rounding into a producer with as little friction as would be expected in a much smaller plant. Three sections of the mill now are operating, a fourth will begin as soon as some pulleys have been changed, and the remaining two of the six units will be in operation about May 15. The original estimate of saving at the mill is being approached, now being above 75 per cent., and the concentrates are already running 40 per cent. copper. The most notable feature is the capacity developed. The units guaranteed to handle 350 tons of ore per day are concentrating 500 without strain, and a recent test resulted in one unit handling ore at the rate of 755 tons per day. The ore pocket at the bottom of the main shaft (No. 4) is completed, the mechanism that controls the gates by compressed air having been installed. The vast caving system that will gradually lower the capping covering the whole ore zone is well begun. Ore will be taken equally from surface stock piles (dumps) and underground development until the former are exhausted. The present rate of underground development is being carried on at the rate of 2000 ft. monthly.

Ray Central—The company reports as follows: "Development has been prosecuted steadily since the last report, and over 3000 ft. of additional underground workings have been driven on the Globe-Isabella claims, and a total of more than 1500 ft. of additional churn drilling has been done, the results of which have been of a most satisfactory character. The best showing has been made on the 100-ft. and the 400-ft. levels of the Globe-Isabella group. A large and rich extension of the known orebody has been opened up on the 400-ft. level and all underground work is now being concentrated on that level. The two holes put down on the west end of the Globe-Isabella group have proved the contention of Messrs. Weed & Probert that the diabase, which it had been assumed limited the orebody, was underlaid by schist, and that the diabase itself carried ore of commercial value. These holes have to date proved up 35 ft. of ore in the form of chalcocite, averaging 3.15 per cent., and this in a part of the property not heretofore considered mineralized. The churn drilling on the Calumet group has been temporarily abandoned, and the drills brought on to the east end of the Globe-Isabella group, and two holes are being sunk, both of which should be in ore at approximately 350 ft., and will be sunk to 500 ft. It is planned to put down other holes in this part of the property."

Ray Consolidated—All concrete foundations for the equipment at Mine No. 2 have been laid, and the assembling of parts for the incline and vertical hoists, the crusher, the compressor is being pushed forward speedily. The adit tunnel at this point has been electrified but, pending the completion of the transmission line from Hayden, is operated by a local generator. The tunnel will be 4500 ft. in length when the two headings meet, which will be within the next month. Considerable ore is mined at this working and is dumped within easy reach of the railroad. All of the ore that has been sent to the concentrator has been extracted from Mine No. 1. An average of 1000 men, all Mexicans except timbermen, pipemen, pumpmen, bosses and a few miners and machinemen, are employed underground. The first unit of the concentrator has been running regularly since April 16, treating 700 tons daily. The capacity of this part is 1000 tons, and it will be brought up to that point when a few changes have been made.

MOHAVE COUNTY

Gold Road—After a thorough examination and sampling of the property, it is understood an offer to purchase was made of $1,250,000 as against an asking price of $2,000,000, and the principal owners, Bayley & Posey, of Los Angeles, are now abroad conferring with foreign stockholders as to the acceptance of the offer of the United States Smelting, Refining and Mining Company, which offer about covers the net value of the ore in sight.

SANTA CRUZ COUNTY

Phelps-Fisher—At the deepest sampling of this mine made a day or two ago 4 ft. of quartz (pyritic) gave 1 oz. gold to the ton. The owners are much encouraged and will probably install a small mill.

Four Metals—Work is being pushed on the new tunnel to undercut this deposit at a depth of about 400 ft. The tunnel 125 ft. above this showed about 500 ft. of copper ore of low grade.

Polaski—Torrels and Michelski have recently made a shipment of copper-silver ore from this claim. This last shipment ran $26 per ton.

Felipe—This mine is now being developed by the owner, G. E. Lopez, and ore has been put on the dump to be shipped later.

California

AMADOR COUNTY

South Eureka—Dividend of 7c. per share, totaling $21,000, was paid April 15. A new vertical shaft south of the present shaft is contemplated with the purpose of increasing the output.

Valparaiso—A compressor and other machinery is on the ground for installation at this mine near Middle Bar.

Argonaut—More than $30,000 has been expended for improvements in two years, including compressor, sawmill, with wedge and framer machine, automatic drill sharpener; improvements now in course and contemplated include a 500-h.p. electric hoist on concrete 20 ft. deep, powder magazine, bath and change house.

ELDORADO COUNTY

Hope—Good pay gravel has been recently uncovered at bedrock in this mine near Placerville. In former years this deposit was approached within about 30 ft. The present force of 20 men is to be immediately increased. N. H. Burger, of Placerville, and others, owners.

Gray Wing—This gravel mine on Blue ravine has been bonded to Oakland men, and is being developed by Polk Gray.

FRESNO COUNTY

Standard—Well 78, on Sec. 28, T 19 R 15, has come in at 450 bbl., thus proving that there is no break in the formation between the East and the West side fields of Coalinga district; or rather adding to the evidence of the Empire on Section 29.

HUMBOLDT COUNTY

Horse Mountain Copper—J. R. Finletter is inspecting these mines in company with J. A. Prentice, of Eureka.

MARIPOSA COUNTY

Oro Rico—Grading a site for the stamp mill is in progress at this mine, near Coulterville, which was purchased of Capt. A. H. Ward, of Oakland, by San Francisco parties about a year ago.

Number Five—This mine, at Hornitos, will resume operations under superinten-

dency of Carl J. Smith, recently from Duluth, Minn. An electric power line will be installed.

INYO COUNTY

Saline Valley Salt Company—Surveyors are running a line for the proposed bucket tram from the salt beds east of the Inyo range to the Southern Pacific railroad near Whitney. White Smith, of Bishop, president. Inyo county people have taken about $70,000 worth of the stock in this enterprise.

MARIPOSA COUNTY

W. W. Beeson, who successfully operated a suction dredge on the Sacramento river last year, is building an improved type of suction boat for operation on Merced river near Barrets bar. The boat will cost $60,000, and will be put in commission about May 1.

Bullion Hill—The board of directors has elected A. L. Richardson president, A. W. Richardson secretary; head office, Merced.

Original—This company has been organized of business men at Merced to operate its mine near El Portal. J. F. Bedesen, president.

Colorado

GILPIN COUNTY

Ore shipments from the mines of Gilpin county during March were heavier than during any previous month in the last three years. From Black Hawk 168 cars were shipped during the month and the Gilpin tramway carried to the mills 650 cars. A big percentage came from mines that have been dormant for 20 years. The erection of modern concentrating mills accounts for the increased output.

Gibson—This mine, on Quartz hill, is being successfully operated by Denver parties. The ore is shipped to Golden.

Egyptian—This property, on Quartz hill, is keeping up its monthly output and for March shipped 100 tons, values from $18 to $25 per ton.

Cashier—This company has completed the main shaft to 1000 ft. and has a streak of copper; a shipment is being treated at the U. P. R. mill.

Jersey Blue—This mine has installed a 40-h.p. boiler and hoist and all necessary improvements are advanced and the company will start up soon.

GUNNISON COUNTY

Augusta Metal Mining Company—This company, C. L. Arzeno, Cincinnati, Ohio, president, is planning to erect a mill.

LAKE COUNTY—LEADVILLE DISTRICT

Iron Silver—This property is again to the fore with a new orebody. The find is in the eighth level of the Tucson shaft, and the ore contains zinc, copper, gold and silver.

PARK COUNTY

For a consideration of $30,000, the Colorado Gold Mining and Smelting Company, which owns the pyritic smeltery at Alma Junction, has purchased the Grover Cleveland and Winnie patented claims and the Atlantic group, consisting of 23 unpatented claims, all in Consolidated mining district. This acreage is a valuable asset to the already large holdings of the smeltery company.

SAN JUAN DISTRICT

Mayflower—Otto Mears and others have made arrangements to operate the Mayflower in conjunction with the Iowa Tiger.

Gold King—The Silverton Gladstone & Northern is now opened to Gladstone and material is now on the ground for rebuilding the bunk houses and other buildings.

San Antonio—This mine is making arrangements for an active season's campaign. It is probable that J. O. Campbell, who was the receiver, will be in charge.

Camp Bird—The March profit is estimated at £19,105, representing the total net profit from the company's various holdings.

SUMMIT COUNTY

June Bug—It is reported that the new strike in this property assays 100 oz. silver, 8 oz. gold and lead in paying quantities.

TELLER COUNTY—CRIPPLE CREEK

Elkton Consolidated—This company paid a dividend April 23 for the regular bi-monthly period of 1½c. per share, amounting to $37,500. This makes the total for 1911, $75,000, or dividends to date for all time $2,794,460. This company will soon be drifting over to its newly acquired property, the Ida May.

Jennie Sample Consolidated Mines—A 30-ton shipment from the Ophir shaft, belonging to this company, is the first shipment for a long period. It is reported to go over 20 oz. gold.

Rose Nickles—A four years' lease on this property was granted W. C West and associates. The shaft on Battle mountain is down 600 ft. and is to be sunk 200 ft. This property adjoins the Portland ground.

Vindicator—The shaft is being sunk from the 1400-ft. level 200 ft. additional. From No. 1 shaft about 60 cars are being shipped.

Jo Dandy—This mine, on Raven hill, is being sunk another 500 ft., and a mill is being built by Tom Kavalagh, who has purchased part of the machinery of the Homestake plant.

Isabella—General Manager Gardner has let a contract to sink 500 ft. on the Lee shaft. Additional machinery was installed to handle sortings from the dump.

Idaho

COUER D'ALENE DISTRICT

Hercules—At this mine the new 600-ton mill, costing $100,000 is in operation. The company is planning a tunnel of more than 11,000 ft. to explore the silver-lead bodies at a depth of 3000 ft. The bore will pass near the Tamarack & Chesapeake property.

Indiana

BLACKFORD COUNTY

The high-grade petroleum fields show an increase in completed wells and production. Out of six wells completed during the past week all are good producers, except one dry hole.

CLAY COUNTY

A joint session of the miners' and operators' boards of District No. 8, was held in Brazil April 26, to settle a grievance at the mine of the Otto Creek Mining Company, over a system of dumping. The miners complain that the new system lessens the earning capacity of the men, while the company maintains that the same system is used in other mines throughout the State.

SULLIVAN COUNTY

A ruling of special interest to land owners and operators has been made by Judge Brickwell in the case of Frank M. Need, against the Jackson Hill Coal and Coke Company. The court held that the mining company had no right to allow poisonous or injurious water to escape to and flow along a natural waterway where it injured the land belonging to another.

Michigan

COPPER

Lake—R. W. Weeks has recently completed another examination of this property and is very optimistic regarding its future. He is especially pleased with conditions to the north of the shaft and also believes that the lode exposed by the shaft at the sixth level contains possibilities and warrants further development.

La Salle—This company has curtailed production and is now sending only about one car of 40 tons of rock to the mill daily. No. 2 shaft on the Tecumseh tract is coming into an improved condition with depth.

GOGEBIC IRON RANGE

Duluth men are exploring at Plummer at the extreme west end of the Gogebic range. J. T. Bush, of Norway, Mich., has charge. A diamond drill is used.

Norrie—This group, operated by the steel Corporation, and including the Norrie, East Norrie, Aurora, Old Pabst and New Pabst mines, is expected to produce 1,250,000 tons this season.

Ashland—It is expected that this mine of the Cleveland-Cliffs Company will

produce approximately 225,000 tons this season. After the Newport and Norrie mines, it is the largest shipper on the Gogebic range.

MARQUETTE IRON RANGE

American—At this old property, idle from 1893 until 1907, at which time it was taken over by the M. A. Hanna interests, of Cleveland. J. R. Thompson, who conducted the exploration at the Newport mine which resulted in the location of a new orebody at 2000 ft., is in charge. Exploratory work is progressing satisfactorily.

Palmer Lake—Development is progressing satisfactorily at this property, which will be a new shipper on the Marquette range this season. Thomas F. Cole, of Duluth, is interested. The property is being operated by the Volunteer Ore Company. The shaft is 400 ft. deep and several levels are being opened. The mine differs from others in this locality in that the ore is of bessemer grade.

Negaunee—The Cleveland Cliffs Company will erect a number of modern mine buildings at this property, and the new shaft is being walled with concrete from top to bottom. The buildings for which plans are in preparation are a miner's change house, an office and a laboratory. The former will be one of the largest and most complete in the Lake Superior district.

MENOMINEE IRON RANGE

Lindahl—A discovery of ore has been made on this property at Beechwood, in the Iron River district of the Menominee range. While little is known regarding the find, the ore was encountered at a depth of 212 ft. This find, however, considerably widens the Iron River district.

Missouri

Freeman—William West has struck rich ore in a shaft on the Freeman lease, south of Kathleen, at Toms station, by sinking seven ft. deeper. Drifts have been driven in four directions opening up a large deposit. It is reported that the mine has been optioned for $65,000.

U. G. Wilson—This company has sold its 40-acre lease and mine at Spring City, to the Spring City Company organized by New York men. C. W. Landrum, former manager of the American company, is general manager with offices in Joplin. This mine has been a large producer and has a well developed orebody and two mills.

Marion—This company, operating on the C. C. Playter land in Gordon hollow, has sunk a shaft 90 ft. deep, and opened up an orebody 40 ft. thick. The lease has been well drilled and a mill will soon be erected.

Bucyrus—Jesse Short, is sinking a shaft on the Murphy land of this company at Tom Station and rich ore has been encountered in several drill holes at 170 ft. depth.

Central States—J. S. Ogglesby manager, has concluded the purchase of McGee mine at Duenweg. This mine has been for three years the largest and most consistent producer of calamine in the entire district. A 150-ton mill will be erected. At least a two-years' run is assured.

Continental Zinc—This company is planning to replace the mule haulage system in their mine at Prosperity with Electric Haulage and small motors have already been ordered. This is the first underground Electric Haulage System ever installed in the district.

Chalman & Lennan—This company is in to ore at 150 ft. with the shaft at Tom station. A 60-ft. face of ore, averaging 30 to 40 per cent. ore has been developed by several drill holes. The 40-acre fee has been purchased by the Company.

Emma C—This mine at Duenweg has been sold to James Kasson, of St. Paul, Minnesota.

Red Ant—This company, operating east of Carthage, is preparing to build a mill to replace the one destroyed by fire.

Montana

BUTTE DISTRICT

Butte & Ballaklava—The annual report for 1910 shows a production of 2,428,346 lb. copper, 106,811 oz. silver and 42 oz. gold. The gross value was $202,120, and the mining cost was $55,-931, giving a net income from ore shipments of $146,188. Ore has been blocked out on the 800-, 900-, 1200-, 1300- and 1400-ft. levels, and it is estimated that 200 tons could be shipped daily from the ore blocked out at the present time. There was 4184 ft. of development. The Ballaklava vein has been developed from the surface to the 1400 level, and an orebody exposed from the 700-ft. level to the 1400-ft. level. Shipments were begun in April, 1910, and continued until Aug. 22, 1910, when a restraining order was issued at the behest of the Anaconda company. At present the shaft is being repaired below the 1200-ft. level, where it was damaged by being flooded. As soon as the shaft is repaired, development will be pushed on the orebody discovered north of the shaft on the 1400 level. The east drift on the 1000-ft. level has shown up mineable ore. The Clymo vein, which on the upper levels appeared promising, has failed to show up commercial ore in the east and west drifts which have been run on the 700-ft. level.

Tuolumne—On the 1600-ft. level the crosscut has encountered the north lode and 8 ft. of fine ore exposed, with the crosscut still advancing in vein material. The ore has an average of 12 per cent. copper, with a few samples running 25 per cent. It is anticipated that the south crosscut on the same level will cut the south lode at any time. The company has a great deal of ore blocked now, and has just increased the daily production from 100 to 150 tons, which will be maintained until the new equipment is installed, which will be some time in August, when it is expected to increase the output to about 500 tons per day. Parts of the new Nordberg hoisting equipment are expected to arrive about June 1. The work of sinking the shaft to the 2000-ft. level will be pushed as rapidly as possible with the old equipment.

Pilot Butte—On April 25, deeds were filed at Butte completing the final transfer of the Pilot mining claim to the Pilot Butte Mining Company. The stock is being wel subscribed, and it is thought that operations will be commenced in May.

Alice—A meeting of the company will be held in Salt Lake on May 8, for the purpose of winding up the company, and turning over to the shareholders, the 30,-000 shares of Anaconda stock received in consideration of the transfer.

Butte & London—W. W. McDowel, president, filed the annual statement, April 19. It shows capital stock paid up to be $5,000,000, with liabilities of $10,000.

Ophir—The shaft is nearing the 800-ft. level, and at the 750-ft. level a pump station will be cut. At present the water is being pumped from the 500-ft. level to the surface, but as soon as the shaft reaches the 1000-ft. level an electric pump will be installed there. The ground has been surveyed, and arrangements about completed for a concentrator.

JEFFERSON COUNTY

Bismark—The Montana-Illinois Copper Mining Company, operating the Bismark claim near Cardwell, has developed good ore recently. The property is on a vein averaging 150 ft. in width, in which the ore lies in a series of lenses containing gold, silver and copper. Development has been done on three levels. Plans are being considered for a mill and concentrator at the mouth of the lower tunnel.

Nevada

ESMERALDA COUNTY

Gold Bar—Operations have been resumed on this property at Goldfield by the Copper-Gold Mines Company which has a lease. W. F. Gray is in charge.

Commonwealth—Quartz ore at the 275-ft. level has been disclosed and the outlook is considered encouraging.

Jumbo Extension.—It is reported that minority interests will fight the sale of the Vinegerone interest to the Goldfield Consolidated.

Begole—This syndicate, which has recently secured patent after contest to the White Rock and other properties at Goldfield, is planning to resume. F. H. Begole, of Marquette, Mich., is in charge.

STOREY COUNTY

The Gould & Curry, Best & Belcher and Savage companies are cutting a station in the north lateral branch of the Comstock tunnel, 1700 level preparatory to sinking a joint three-compartment winze to the lower levels. A large compressor, together with drilling outfit, is being installed. An electric hoist will be erected when sinking begins.

Mexican—Development has been done on the 2200, 2300, 2400 and 2500 levels, strengthening the recent ore strike. From the 2500 level, the two-compartment raise in the ore was carried up for the ninth-floor set of timbers, and from the opening a large tonnage has been extracted giving an average assay of about $100 to the ton, all the material being saved for ore. The rich streak of ore at this point is 12 ft. in width, and the body of second-class ore to the west is estimated at 20 ft. wide. On the 2400 level, the north drift, advancing in the vein, is in ore the full width of the drift, car assays giving average of $30 to the ton. The face of this drift is about 60 ft. south of a point over the raise in the ore on the 2500 level. On the 2300 level, the north and south drifts in the vein have been advanced and the car assays give values between $50 and $60 per ton. The orebody has now been opened on three levels, and a north drift is being driven on the 2200 to cut the vein above. Mexican last week shipped five railroad cars of first-class ore to the California.

Ophir—This company last week continued the extraction of ore from the Hardy vein stopes on the 2100 level, and the cars gave assays of about $30 to the ton, the output from these stopes for several months averaging $50,000 per month. On the 2500 level of the mine, an east crosscut is being run to a point 180 ft. from the winze station, where air connection will be made with the 2500 level workings of the Mexican. A southwest drift will be started soon from this east crosscut to open a block of virgin ground.

Con. Virginia—In this mine prospecting continues near the old stopes on the 1650, 1700 and 1750 levels, and low-grade ore is being extracted from the 1800 level, regular shipments being made to the Comstock mill at Sutro. On the 2450 and 2550 levels, prospecting drifts are being driven in a strong vein formation, this territory below the old Bonanza workings not having been explored previously. At the C. & C. shaft, the Evans' hydraulic elevator pumps have the north end Comstock properties drained below the 2650 station of the shaft.

New Mexico

GRANT COUNTY

The Marcus Daly heirs have an option on the Tyrone group, at Tyrone, New Mexico, and one on the Bonita group. These interests are operating two Star drills at Tyrone. The Tyrone group adjoins the Chemung Copper Company on the northeast. The Bonita group is a large porphyry area lying across the Mangas valley from Tyrone in a northeast direction. The Chemung Copper Company is working about 125 men underground and in the last eight months has developed a large body of high-grade ore. The Savanna Copper Company is running two Star drills and is continuing to find ore. It is developing the section where it encountered 135 ft. of 5½ per cent. copper ore in a drill hole at the depth of 600 ft. last fall. This company expects to sink a shaft soon on this orebody. The Azure Mining Company is actively mining turquoise in the New mine, through a winze to the third level. The area of copper lands now held by this company is the largest of any holdings in the Burro mountains, being between 3000 and 4000 acres. The Chino Copper Company's 3000-ton concentrator, at Hurley, is progressing rapidly. The steam shovels are active at the mine getting ready to produce ore for the mill. The Indian Copper Company has taken over the claims and mines of the Hermosa Copper Company, near the Chino property and is testing the same with two drills.

Utah

SALT LAKE COUNTY

Ohio Copper—Three of the first four rolls, the invention of Col. E. A. Wall, are to be shipped shortly by the Salt Lake Engineering Works to the mill at Lark. The fourth set of rolls is being finished.

Silver Shield—A statement has been sent to stockholders explaining that the recent assesment was levied to carry on the new development from the tunnel level.

Utah Metal Mining—A statement has been issued to holders of the Bingham Central and Bingham, Standard bonds by W. B. Farmer, president of the Utah Metal Company, requesting them to exchange their bonds for a new issue authorized for this purpose. This issue is guaranteed by the Utah Metal Company, and the new bonds are for the same amount, dated April 1, 1911, payable in five years with interest at 6 per cent. The total authorized issue is $375,000 and cannot be increased. The bonds are convertible at any time into stock of the Utah Metal Company at $5 a share.

Utah Consolidated—At the annual meeting, held in Jersey City, April 19, U. H. Broughton was elected president, the office being closely contested by G. L. Walker. A total of 210.658 shares of the 300,000 shares outstanding were represented, 107,339 shares and proxies being voted for Mr. Broughton as against 94,319 for Mr. Walker. There were no changes in the board of directors. A recnt statement made by President Broughton says that since September 14,-432 ft. of development have been done. The company made greater profits in the first quarter of 1911 with copper at 12¼c. than it did during the whole of 1910. Since the last annual report, development on No. 10 level has added to the reserves then reported, and in addition a body of lead ore was found in new territory on the lower levels. This has been opened for over 100 ft., and averages 5 ft. in thickness, with the face still in ore. It will net the company about $6 per ton at the present prices.

Emma Copper—The continuation of the ore in the faulted Emma vein has been found in this company's Montezuma claim, according to General Manager Wantland. Should this turn out to be the faulted ore of the old Emma, which adjoins the Emma Copper Company, as thought by General Manager Wantland, it will stimulate active interest in this section of the camp.

Utah Mines Coalition—Work suspended since January was resumed at this property, April 8.

Cardiff—Ore has been followed 335 ft., and averages 2 ft. in thickness for this distance. Shipments during the past season carried over $50 per ton. A winze is being sunk below the tunnel level, and has opened ore 2½ to 3 ft. between walls. This ore is similar to that in the recent strike of the Columbus Extension, and is thought to be on the same vein system. Shipments will be resumed June 1.

WASHINGTON COUNTY

Iron King—It is reported that these claims in Bull valley, covering large iron deposits are to be examined by Eastern interests. It is also understood that the same party will look at the Judd group of 16 iron claims on the Colorado river, south of St. Thomas, Nev.

Washington

OKANOGAN COUNTY

About 16 claims on Copper mountain, in the Chesaw district, have been bonded by the Granby Consolidated Mining and Smelting Company for $165,000, and a camp is being located.

Molson—The stamp mill is to be enlarged this season, and the working force increased. J. A. Plomert, Chesaw, manager.

Cain Gold—As soon as the weather will permit, a compressor and power drills will be installed on this property, near Chesaw. A tunnel is in 225 feet.

Olentangy—Operations are to be resumed at this mine, near Chesaw. Considerable development work will be done this season.

West Virginia

West Virginia Coal Lands Company—This recently organized company has bought from the Gallego Land Company 27,000 acres in Fayette, Kanawha and Raleigh counties, and has sold various tracts to companies now operating under lease, and will make leases or develop the remainder. The Milburn Coal and Coke Company, the Republic Company and the Christian Colliery Company are among the operators which purchased the tracts they have been working. The Selbay Company will buy its leased lands and the Eagle Collieries Company will be organized to buy and develop 2500 acres. This latter company has H. H. Rothwell, of Burnsville, W. Va., as manager and engineer in charge.

Canada

Ontario-Cobalt

Green Meehan—A discovery of high-grade ore has been made on the 100-ft. level of this property.

Crown Reserve—High-grade ore has been found in the main vein at a depth of 450 feet.

Rochester—The management has decided to sink the shaft to 400 feet.

Provincial—A new oreshoot has been opened up on the 270-ft. level of this Cobalt property.

Beacon—This Elk Lake company is installing a plant, and will do underground work.

Ontario—Porcupine

Boyce—The Canada Northern Explorers, Ltd., has an option on this claim. A 40-ft. reef carrying free gold has been uncovered at the surface and a shot drill has been set up and will cut the quartz at depth.

Lindberg—Manager Rose has let a diamond-drill contract to cut the vein three times on this property. The drill is on the grounds and running. One of the earliest finds of gold in the district was made on this property.

Hollinger—In the northwest crosscuts a vein parallel to the main vein was cut at 170 ft., which is showing up well in gold. Two crosscuts are being driven to the southeast and are now in 80 ft. each. In these it is expected to cut another large vein at about 100 ft. One hundred and forty feet of drifting has been done on the 214-ft. level.

Crown Charter—A crosscut has been let to sink the shaft to the 100-ft. level from which a crosscut to the vein will be be driven. The shaft is down 40 ft. and struck the vein at 26 ft. from the shaft.

McIntyre—Exceptionally good showings are being made on the north vein of this property. The hoist is set and sinking will be continued immediately.

Gillies Lake—Babayon & Parnell own the water rights on this lake and have set up a shot drill to find the McIntyre vein.

Moneta—The camp is completed and trenching is being carried on. Two quartz outcrops have been located so far. Charles Williams is manager.

Rea—The shaft is down 180 ft. and is being hurried to the 200-ft. level from which a crosscut to the vein will be driven. The second diamond drill hole has been started. So far the diamond drill cores have shown up well.

J. Smith—W. S. Edwards has acquired these claims which lie west of the Davidson for $150,000. By trenching a quartz outcrop has been uncovered which is 50 ft. by 150 ft., beyond which no trenching has been done. The camp is now up and sinking and trenching will begin next week.

Dome Extension—Sinking is being continued on the vein. In trenching last week the workmen uncovered a stringer from the main vein carrying visible gold.

Ontario Porcupine Goldfields Development Company—This company has been floated in England, and will be the operating concern for the Northern Ontario Exploration Company. These two flotations were made by Bewick Moreing & Co., of London, and will control the large acreage purchased from the Timmins-McMartin Syndicate.

Yukon Territory

A deal has been concluded by which the Guggenheim interests of New York acquire the richest portion of Gold Run creek, which has already produced millions, and also the Cruger concession on Dominion creek, extending down the stream for two miles from the mouth of Sulphur creek and covering the full width of the valley. The consideration is said to exceed $500,000. The property has been controlled for years by the Canadian Bank of Commerce. Gold Run was grouped and operated first by Chute & Wills. Later Count Carboneau became interested in it, and still later the bank got control of it through a mortgage for $650,000. The foreclosure litigation was recently settled.

Mexico

San Antonio District

Compañia Metalúrgica de la Baja California—The operations of this company are of the most importance in this district. The new plant is in full operation day and night, and the manager, Frank Lawrance, reports his anticipations fully realized with the capacity of the plant and more than realized as regarding extraction. E. L. Johnson, chemist and metallurgist, has overcome all the small difficulties regarding the acidity, etc., of the various ores and has reduced consumption of cyanide. The plant has been running 10 full days and the extraction has not been below 83 per cent., and has been considerably higher during the past three days.

San Juanes Reduction Company—The chief director of this company has purchased additional machinery for the cyanide plant. After a successful run of 500 tons of oxidized ore, the mill was stopped and will not be started up until the new automatic screens are in place.

Trinidad Mines Company—E. H. Alford, of Chicago, one of the chief operators of this company, is supervising the extraction of a 200-ton parcel of good grade ore from the various properties of the company's holdings. He expects to return before the end of the year to undertake the erection of a treatment plant.

Las Canoas—Leonard Orynski, owner and operator of this property, has encountered a body of fair-grade ore, which he hopes to treat in his plant, which has been in operation for many months.

Brazilar y Anexas—This company, formed in Mexico City of several influential men, has opened operations in one of its four properties known as Brazilar. In June work will begin in the other three properties, Guasabe, La Mina Rica and La Cruz de las Flores.

Progreso Mining Company—Through an accident in which six employees were killed, this company is suffering a temporary shutdown.

In the Todos Santos district there is still considerable excitement and much ground has been applied for.

Jalisco

The Southern Pacific road announces that it will at once extend the line from Magdelena west to La Quemada a distance of nine miles. This will aid an important mining section.

El Favor—The mill in the Hostotipaquillo district is in operation treating about 100 tons daily.

Africa

Transvaal

Gold production in March was 649,247 oz. from the Witwatersrand and 26,818 oz. from the outside districts; a total of 676,065 oz., or 65,249 oz. more than in February. For the three months ended March 31, the total was 1,784,109 oz. in 1910, and 1,937,920 oz.—or $40,056,806—in 1911; an increase of 153,811 oz. The production this year was from 69 mills, having a total of 9701 stamps at work. The number of negro laborers employed at the mines on March 31 was 212,011, an increase of 4250 during the month.

The Markets

Coal Trade Review

New York, May 3—In the East the bituminous trade is quiet, and shows no material change. Anthracite trade has been active and rather lively.

In the West the trade seems to be steadying itself and is in rather better shape. This is not so much because trade is improving, but rather because operators are adjusting themselves to conditions and limiting production to the requirements of business. In many important districts mines are not running over half time. The limitation of production has served to help prices at selling centers and to prevent a general sacrifice of coal, which was threatened not long ago.

Apparently the strike of the miners in British Columbia and Alberta will be adjusted, the government having granted the request for the appointment of a conciliation committee. The miners will return to work, pending its report. C. W. Gordon, of Winnipeg, Manitoba, is chairman of the committee, which has begun to take testimony.

The Lake Coal Rate Cases—The hearing before the Interstate Commerce Commission on the Pittsburg coal-rate complaints was, on April 26, continued over until May 22, when this case will be joined with the investigation and suspension of the proposed advances in rates on coal from the Pocahontas and other West Virginia fields to the Lake ports. These two cases bear a great similarity to one another. It was brought out in the testimony that the West Virginia rates are the lowest coal rates in the country. The railroads have used this as an argument for desiring to increase these rates, because, they said, the West Virginia fields are developing so rapidly that they threaten to take away much of the business of the Pennsylvania fields. In defending the Pennsylvania rates the witnesses almost without exception compared the rate with some higher rate now in existence.

Coal Traffic Notes

Coal and coke tonnage of Chesapeake & Ohio railway, eight months of fiscal year from July 1 to Feb. 28, short tons:

Delivered to	Coal	Coke	Total
Tidewater	2,851,274	15,588	2,866,862
East of mines	1,351,076	142,952	1,494,028
West of mines	6,349,319	57,823	6,407,142
Total	10,551,669	216,363	10,768,032
Total, 1909-10	9,779,369	278,965	10,058,334

Total increase this year, 709,698 tons, or 7.1 per cent. Deliveries to tidewater this year were 27 per cent. of total; points east of mines, 13; west, 60 per cent.

Current Prices of Metal, Minerals, Coal and Stocks, Conditions and Commercial Statistics

New York

Anthracite

May 3—Tidewater demand for prepared sizes has been very good indeed. Dealers are taking unusually large stocks, and there seems to be a good demand all round. Mines have been running close up to full time, and little or no coal is going to the storage yards. Steam sizes are also in good demand.

On May 1 there was 10c. taken off the summer discounts. Schedule prices for May on domestic sizes are $4.35 for lump, $4.60 for egg and stove and $4.85 for chestnut, all f.o.b. New York harbor. On steam sizes there is no change and quotations are: Pea, $3@3.25; buckwheat, $2.35@2.80; No. 2 buckwheat or rice, $1.80@2.30; barley, $1.40@1.75; all according to quality, f.o.b. New York harbor.

Bituminous

Seaboard trade does not pick up as it ought to do at this season. New England seems to have gone out of the coal business for the time being. Contract making is very slow. Harbor trade is not active and there is little interest. Shipments to tide are limited, so that there is little surplus to trouble the market.

Prices, if anything, are lower. Steam coals can be had at $2.30@2.40 for lower grades, with better coals up to $2.75@2.85. A good Miller vein coal can be had around $2.50@2.60, f.o.b. New York harbor. Gas coals can be had at $1.05 for ¾-in., $1 for run-of-mine and 75@80c. for slack, all at mines.

Coastwise trade is rather slow and rates are weaker, but rather unsettled. Tonnage can be had at 70@80c. from Philadelphia to Boston or Portland. From New York 60@65c. is charged to Boston or Portland; 30@40c. to Providence and Sound ports.

Birmingham

May 1—There is but half the normal production of coal in Alabama at present. The coal market is rather quiet. Some coal operators express the belief that the summer is not going to be a dull one, despite present conditions. Some of the mines in this State are working on but half time. The shipments of coal to the Gulf Coast are quite steady but not as active as they were a few weeks back.

There is a fairly good demand for coke. The new by-product coke ovens of the Woodward Iron Company are doing well. All work on the by-product coke ovens being constructed by the Tennessee Coal, Iron and Railroad Company is being pushed and toward the end of the year they will be ready for operation.

Chicago

May 1—Quiet conditions continue in the coal market, though the volume of buying is very satisfactory for the time of the year. Sales are chiefly in small quantities, but many, and the aggregate must be large. Steam-using plants are buying largely but on short time; the volume of contract buying has fallen off somewhat, in view of the large amount of coal in sight for transient buying. Receipts are plentiful from all markets. Illinois and Indiana coals, which furnish the greater part of the supply, for both steam and domestic uses, bring $1.90@2.45 for lump and egg; $1.75@1.85 for run-of-mine, and $1.50@1.80 for screenings. The demand is still strong for screenings, lump being weakest. Of coals from east of Indiana the strongest is Hocking, which continues at $3.15, with no oversupply. Smokeless has been too plentiful and apparently will be better regulated within a few days, by restriction of shipments. Smokeless sells for $2.90 lump and $3.15@3.30 run-of-mine, with occasional cuts of 10@15c. below these minimum quotations. Anthracite sales are very good for the season, though in the last week they have lessened slightly in view of the May advance of 10c. a ton.

Cleveland

May 1—Lake trade is slow yet; vessels are not yet ready, most of them holding back until iron ore begins to move. Meantime the yard tracks are full and railroads will not take Lake coal.

Local trade is fair only, the demand for steam coal being slow. Slack is rather scarce, but other grades are plentiful. Prices are unchanged.

Indianapolis

May 1—Steam trade is picking up slowly; domestic trade is dead for the time being. Most mines are running about half time, some a little short of that. Contracts are being closed, generally on the same basis as last year—$1.10@1.15 at mines for No. 4 run-of-mine.

Pittsburg

May 2—There is quite a congestion of coal on track between mines and Lake ports, as very little coal is going up the Lakes, partly on account of the general dullness but chiefly because there is no disposition to move iron ore. Operations at mines will probably have to be curtailed as the movement can hardly support the recent rate of production. Local demand for coal is very poor. Quotations are moderately well maintained: Nut, $1.05@1.15; mine-run, $1.10@1.15; ¾-in., $1.20@1.25; 1¼-in., $1.30@1.35; slack, 75c. per ton at mine.

Connellsville Coke—The market continues very quiet, there being little fresh demand as the tendency for blast furnaces is to go out rather than to go in. A sale of 2500 tons of good furnace coke was made today at $1.65, for May delivery, quality and regularity of delivery counting in making the price. Odd lots of good grades are offered down as low as $1.50 occasionally. Producers' ideas of prices on contract are slightly lower, but there is nothing definite, as there are no active negotiations on contracts. We reduce quotations slightly: Prompt furnace, $1.50@1.60; contracts, balance first half, $1.60@1.70; contracts, second half, $1.70@1.90, at ovens.

The *Courier* reports production in the Connellsville and lower Connellsville region in the week ended, April 22, at 312,942 tons, a decrease of 36,000 tons, and shipments at 3546 cars to Pittsburg, 5375 cars to points West and 779 cars to points East, a total of 9700 cars, a decrease of 600 cars.

St. Louis

May 1—Being at the end of the month dealers and manufacturing plants are not buying any coal; combined with the warm weather of this week, business in the coal trade has been at a standstill. In the Standard district, as was anticipated, several mines have shut down, having filled their contracts for the past year, which depicts very clearly the condition of the St. Louis market. These conditions do not prevail only in the Standard district but also in the Carterville district, where also several mines are shut down. Very little of this coal in coming into the St. Louis market with the exception of screenings and a little mine-run coal. Carterville screenings have advanced in price and are now bringing 72½@75c. per ton. This advance has also had effect on Standard screenings which are now selling at 70c. per ton at mine. The demand for larger sizes is dull and unless they sell more freely, screenings will again be where they were in price last month, 77½@80c. per ton at mine.

The demand from the country on both Carterville and Standard coals is very light.

Anthracite—The market, of course, is very slow. Evidently several firms must have thought there was a great deal of money in selling hard coal as at least five to ten firms are selling it this year who did not handle it last year. This, of course, has the usual effect on the market of cutting the circular price. Nearly all of the chestnut size has been sold at 15c. per ton off the circular.

FOREIGN·COAL·TRADE

United States Coal Exports—Exports of coal from United States ports, with coal furnished to steamships in foreign trade, three months ended March 31, long tons:

	1910	1911	Changes	
Anthracite	531,252	608,291	I.	77,039
Bituminous	1,897,586	2,174,121	I.	276,535
Total exports	2,428,838	2,782,412	I.	353,574
Steamer coal	1,500,047	1,548,492	I.	48,445
Total	3,928,885	4,330,904	I.	402,019
Coke	240,841	257,893	I.	17,052

Canada took this year, 1,897,683 tons of coal, or 68.2 per cent. of the total. The coke went chiefly to Canada and Mexico. Cuba and the West Indies took 394,237 tons of coal.

United States Coal Imports—Imports of bituminous coal and coke into the United States, three months ended March 31, long tons:

	1910	1911	Changes	
Bituminous coal	475,655	426,279	D.	49,376
Coke	31,709	37,791	I.	6,082
Total	507,364	464,070	D.	43 294

Anthracite imports are not reported; they amount to only a few tons. Canada supplied this year 356,130 tons of coal and nearly all the coke; Australia, 47,408 tons coal; Japan, 18,014 tons of coal. Imports are chiefly on the Pacific Coast and in the border States of the Northwest.

Welsh Coal Prices—Messrs. Hull, Blyth & Co., London and Cardiff, report prices of coal on April 22, as follows: Best Welsh steam coal, $4.14; seconds, $3.90; thirds, $3.78; dry coals, $3.84; best Monmouthshire, $3.72; seconds, $3.54; best small steam coal, $2.46; seconds, $2.22. All prices are per long ton, f.o.b. shipping port, cash in 30 days, less 2½ per cent. discount.

IRON·TRADE·REVIEW

New York, May 3—The iron and steel markets continue quiet, apparently waiting for developments. There has been practically no change since the last report. The reduction in Lake ore prices will have little immediate effect, since so many furnaces are stocked for some time to come. At any rate, few or no concessions in prices of pig iron have yet resulted. Sales have been on rather a limited scale, buyers, apparently, not being anxious to commit themselves far ahead.

Structural steel is fairly active, with promise of more contracts coming. Low prices named by fabricating companies continue the rule. In other finished material new business is slow in coming forward. A few scattering orders for rails keep coming in, but no large business.

Nothing whatever has been done by the agricultural-implement interests as to steel-bar purchases for the new manufacturing season, which should begin in July, or August at latest, and against which business specifications ought to be going to the mills now. In previous years the agricultural tonnage has always been contracted for before this time, but this year not even a start has been made. The old-rail rolling mills in the Central West are selling hard-steel bars down as low as 1.25c. at mill, while iron bars are 1.30c., Pittsburg and Valleys, and 1.22½c. or lower, Chicago. These prices contrast with the soft steel-bar base, which is 1.40c., Pittsburg, with freight to destination added, and extras for hard steel, etc. The feeling is growing that steel bars at least will have to be reduced.

It is not improbable, however, that the large steel interests have already decided that a general reduction in steel prices will have to be made, and that they are only waiting until business backs up to make the reductions, so as to have a good foundation for a general buying movement. The large interests are holding prices of rails, bars, plates, shapes, pipe, wire products, etc., very closely, but, of course, there is shading by small interests.

A Pittsburg despatch today reports that freight rates on iron ore to Lake Erie ports have been fixed at 60c. from Duluth and Two Harbors, 55c. from Marquette and 45c. from Escanaba. This is a reduction of 10c. from last season.

Rebates on Ore—The Federal grand jury at Cleveland, O., has found indictments against D. R. Hanna, Robert I. Ireland, D. T. McCabe, the Lake Shore, the Pennsylvania, the Nickel Plate and the Bessemer & Lake Erie railroad companies. The charge is the granting of rebates from dock charges at Cleveland, Ashtabula and other ports to certain shippers of iron ore to those ports, thereby discriminating in their favor against ordinary shippers.

Baltimore

May 1—Exports for the week included 2073 tons rails and 127 tons rail-joints to Rosario, Argentina; 2,818,600 lb. steel billets to Liverpool. Imports included 5100 tons iron ore from Cuba.

Birmingham

May 1—The Southern pig-iron market shows no improvement, and conditions are dull. The manufacturers of iron are now considering a further curtailment and are

predicting that such a move will be imperative. Shipments of pig iron from this territory are in small lots, on new buying or on old orders—a hand-to-mouth business. The general quotations for pig iron are on a basis of $11 per ton for No. 2 foundry. It is denied that concessions are being allowed on this price. The home consumption has shown no improvement of late. There is report that the big cast-iron pipe plant of the Dimmick Pipe company will resume operations in all departments in the near future.

The demand for cast-iron pipe is steady and some good contracts are still pending. There is very little going on in the Southern territory with the machine shops and foundries. The fabricated steel trade is the most active. The Tennessee Company's rail mill has been closed down pending improvement in the trade.

Chicago

May 2—The iron market seems to be somewhat better than a week ago, though the demand for pig iron is chiefly for current needs and for the second quarter, with only an occasional sale in the third quarter and last half. Inquiries for last-half needs have become more numerous, but they are probably more to test the market than to provide against the real needs of melters. The common opinion among users of iron and steel products seems to be that the pressure existing today is rather on the producers than the consumers of pig iron; consequently the average consumer holds off until the last moment before making his purchase. It is largely a waiting market now, for the consumer and the producer alike. The sales of pig iron run from a carload up to 1000 tons, with occasionally a larger order, but rarely. Southern iron still is quoted at $15.35, Chicago, or $11, Birmingham, and Northern at $15, both for No. 2 foundry. The Southern furnace agents, at these prices, are more eager to sell than the Northern. Iron and steel products are quiet; no significant change has taken place from last week.

Cleveland

May 1—Iron-ore prices being established, interest is now in freight rates.

Pig Iron—Some fair tonnages have been sold, but the market is not especially active. Prices for Cleveland delivery are $15.90 for bessemer, $14.25 for No. 2 foundry, $13.50 for forge and $17.50@18 for Lake Superior charcoal.

Finished Material—Small contracts for structural steel continue to be closed. Outside of that there is little new business coming forward.

Philadelphia

May 3—Local brokers and agents report today a further holding off in the closing of orders which have been subject of negotiations for two or three weeks past. There appears to be some doubt in the minds of buyers as to the effect of the rearrangement of ore prices on pig-iron quotations. Makers say the influence will be nothing, which is probably the case. There is a disposition among the furnace people not only to clean out stocks on hand but to secure some safe contracts for delivery instead of making iron at their own risk to sell if buyers happen to want it. Two or three sales of basic iron have been made of small quantities. All kinds of iron are dragging. No. 2 foundry is offered at a slight shading to meet some persistent Southern competition.

Steel Billets—The actual consumption of open-hearth and forging billets is fair, but buyers avoid contracts for future deliveries. The business is strictly retail. The only feature of the week has been a reduction of 50c. on forging billets.

Bars—An improvement in bar-iron sales is mentioned and it is traceable to the placing of contracts for common iron which cover a considerable amount. A further demand from this quarter is in sight. Jobbing demand has fallen off.

Sheets—Sheet makers have been unable to withstand the pressure for shaded quotations. The shading is probably permanent.

Pipes and Tubes—Tubing is active for summer delivery and inquiries are increasing. Stocks among manufacturers as a rule have run very low.

Plates—The week's business in plates figures up nicely. New enterprises calling for plates are being pushed.

Structural Material—A batch of orders has been sent to the mills within a week for bridge work, terminal work and car work. Much new work involving structural material is being figured upon.

Scrap—A few sales of old rails have been reported this week; also three or four lots of No. 1 wrought railroad scrap and some heavy melting steel scrap. As a whole the scrap market is again dragging.

Pittsburg

May 2—It can hardly be said that the dullness in the iron and steel trade has been accentuated, for that would probably be impossible, but it can be said that the past fortnight has been the dullest, in pig iron, unfinished steel and finished steel, that has been experienced in years. There is practically no inquiry for pig iron, and sales are the exception. In finished-steel products bookings—in the sense of orders or specifications that can be put on books for rolling—have probably averaged throughout the industry between 25 and 35 per cent. of capacity. It is difficult to make a precise statement as to production, for the reason that the three stages, producing pig iron, producing steel ingots and finished steel, have not run together. There has been a greater decrease in the past few weeks in the production of finished steel than of ingots, and more in ingots than in pig iron, so that steel and pig iron have been piling up at mills. This does not apply, or applies only in a limited way, to the Steel Corporation, which has as usual regulated its departments quite closely, but while it has done this it has not so far reduced production nearly as much as orders have fallen off. Roughly speaking, the country is probably operating between 70 and 75 per cent. of its blast-furnace capacity and between 50 and 60 per cent. of its steel-finishing capacity, while as observed it is booking finished-steel business at between 25 and 35 per cent. of capacity.

The cotton-tie market has not been opened, but probably will be within the next fortnight, by the mills announcing the season price and closing contracts with the distributors in the South.

Pig Iron—The Pittsburg Steel Casting Company has bought 500 tons of basic iron at $14.35, delivered Pittsburg, equal to $13.45, Valley furnaces. A brokerage firm, which a couple of months ago sold some 1500 tons of bessemer iron, of very strict analysis, for foundry use, at $15, Valley, has covered with a furnace interest for the iron, at the same price, but is allowed a brokerage. This is not uncommon in Bessemer iron and is not regarded as cutting the price. The United Steel Company, Canton, inquires for 3000 tons of basic iron for third quarter. The Pressed Steel Car Company has bought 300 tons of malleable iron at $13.75, Valley, the iron being high in manganese; for low manganese $14 is generally asked. We quote at Valley furnaces, 90c. higher delivered Pittsburg: Bessemer, $15; basic, $13.50@13.75; malleable, $13.75@14; foundry, $14 per ton.

Ferromanganese—The market continues quiet, and we quote $36.50, Baltimore, for prompt or forward, freight to Pittsburg being $1.95 per ton.

Steel—It is quite probable that billets and sheet bars, at least open-hearth, could be had at concessions, but there is no business going and we repeat former quotations as nominally the market: Billets, $23; sheet bars, $24, both f.o.b. Pittsburg or Youngstown mill; rods, $29, Pittsburg.

Sheets—Reports of shading in sheets are somewhat more frequent. There is less tonnage going and mills have slowed down, probably running at not over 50 per cent. of capacity on an average. We quote regular prices as follows: Black sheets, 2.20c.; galvanized, 3.20c.; blue annealed, 1.65c.; painted corrugated, $1.55; galvanized, $2.75 per square.

Iron Ore Markets

Prices of Lake Superior iron ore for the season of 1911 are as follows, f.ob.

Lake Erie docks: Bessemer ore—base 55 per cent. iron and under 0.45 phosphorus—$4.50 per ton for Old Range and $4.25 for Mesabi; nonbessemer—base 51.5 per cent. iron—$3.70 for Old Range and $3.50 for Mesabi.

Prices in the East are not controlled by any agreement or association of producers, and it is not possible to give any general quotation. Recent sales of Lake Champlain ore, nonbessemer, have been on the following basis, f.o.b. mines at Mineville, N. Y., for this year's delivery: Old Bed No. 21 furnace ore, $2.90; Old Bed No. 21 lump ore, $3.40; Old Bed concentrates, 65 per cent. iron, $3.70; Harmony ore, 62 per cent. iron, $3.50. This is a basis of 5½@5¾c. per unit of iron, and is about 1c. per unit below last year's figures.

FOREIGN IRON TRADE

Scotch Pig-iron Production—The statistics of Scotch iron for two years are as follows, in long tons:

	1909.	1910.	Changes
Stocks, Jan. 1....	186,045	275,811	I. 89,766
Production.....	1,361,697	1,414,461	I. 52,764
Total supply...	1,547,742	1,690,272	I.142,530
Consumption.....	981,355	1,054,886	I. 73,531
Exports.....	290,576	303,101	I. 12,525
Total.....	1,271,931	1,357,987	I. 86,056
Stocks, Dec. 1..	275,811	332,285	I. 56,474

Consumption is in Scotland. In 1910 foundries took 215,771 and steel works 839,115 tons. The average number of furnaces in blast was 82 in 1909 and 85 last year.

United States Foreign Trade

Iron and Steel—Exports and imports of iron and steel and of machinery in the United States for the three months ended March 31, are valued as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1910	1911	Changes
Exports.....	$45,720,979	$60,022,607	I.$14,301,628
Imports.....	10,360,069	8,072,253	D. 2,287,816
Excess, exp.	$35,360,910	$51,950,354	I.$16,589,444

Increase in exports, 31.3; decrease in imports 22.1 per cent. The leading items of exports and imports were, in long tons:

	Exports		Imports	
	1910	1911	1910	1911
Pig iron.....	13,284	40,976	58,626	41,905
Scrap.....	2,448	19,323	28,944	9,759
Billets, blooms, etc.	4,942	41,725	10,602	19,120
Bars.....	26,370	39,276	8,630	7,193
Rails.....	48,797	105,524	....	.....
Sheets and plates..	71,550	74,772	1,461	662
Structural steel....	28,067	76,748	.....	.....
Wire-rods.....	4,705	3,886	3,672	4,466
Wire.....	36,843	46,711	.....	.....
Nails and spikes..	10,162	20,574	.....	.....
Tinplates.....	3,120	10,601	18,065	7,707
Pipe and fittings..	37,167	44,941	.....	.....

Imports of wire not reported in quantity; values were $378,475 in 1910, and $331,711 in 1911. Imports of rails and structural steel not reported separately. Exports of mining machinery were valued at $1,417,822 in 1910, and $1,745,774 this year.

Iron Ore Movement—Imports and exports of iron ore in the United States, three months ended March 31, long tons:

	1910	1911	Changes
Imports.....	618,883	332,205	D. 286,678
Exports.....	21,887	6,726	D. 15,161

The imports this year included 245,250 tons from Cuba, 48,864 from Spain, 32,904 from Sweden, and 758 tons from Canada.

Manganese Ore—Imports of manganese ore into the United States three months ended March 31 were 51,849 tons in 1910, and 50,230 in 1911; decrease, 1619 tons.

METAL·MARKETS

New York, May 3—The metal markets show no material change from last week, except, perhaps, less activity in copper.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal	Exports	Imports	Excess
Gold:			
Mar. 1911..	$ 505,615	$ 4,119,063	Imp.$ 3,613,448
" 1910..	1,815,815	4,373,885	Imp. 2,558,070
Year 1911..	1 854,024	19,465,737	Imp. 17,611,713
" 1910..	10,916,081	9,568,358	Exp. 1,347,723
Silver:			
Mar. 1911..	5,896,795	3,197,409	Exp. 2,699,386
" 1910..	4,552,624	3,994,456	" 558,168
Year 1911..	16,001,042	10,746,781	" 5,254,261
" 1910..	13,639,547	11,398,139	" 2,241,408

Exports from the port of New York, week ended April 29: Gold, $150,831, nearly all to Panama; silver, $965,668, chiefly to London. Imports: Gold, $69,383; silver, $104,654, from Japan and South America.

Gold—The price of gold on the open market in London remained at the normal level, 77s. 9d. per oz. for bars and 76s. 4½d. for American coin. Gold continues to be taken for India. In New York, $1,050,000 gold was taken for Canadian banks.

Platinum—The market is firm, but unchanged. Dealers ask $41@42 per oz. for refined platinum; $43.50@44.50 per oz. for hard metal. The foreign market is very strong and an advance in prices here is expected.

Iridium—Prices are firm and unchanged at $62 per oz. for pure metal.

Silver—The market continues comparatively steady. Attention should be given to the news that the Imperial government of China has decided on the establishment of currency reform. This move should count for a betterment of the silver situation.

SILVER AND STERLING EXCHANGE

Apr.-May	27	28	29	1	2	3
New York....	54	53⅝	53¼	53⅜	53½	53¼
London .	24⅞	24⅛	24	24	24⅝	24⅝
Sterling Ex..	4.8650	4.8640	4.8645	4.8645	4.8645	4 8645

New York quotations, cents per ounce troy, fine silver: London, pence per ounce, sterling silver, 0.925 fine.

Exports of silver from London to the East, Jan. 1 to April 20, as reported by Messrs. Pixley & Abell:

	1910	1911	Changes
India.....	£2,081,800	£3,023,500	I. £ 941,700
China.....	1,088,500	752,800	D. 335,700
Total.....	£3,170,300	£3,776,300	I. £606,000

India Council bills in London brought an average of 16.08d. per rupee.

Copper, Tin, Lead and Zinc

NEW YORK

Apr.-May	Copper: Lake, Cts. per lb.	Copper: Electrolytic, Cts. per lb.	Tin: Cts. per lb.	Lead: New York, Cts. per lb.	Lead: St. Louis, Cts. per lb.	Zinc: New York, Cts. per lb.	Zinc: St. Louis, Cts. per lb.
27	12⅛@12⅜	11.95@12.05	42⅛	4.40	4.22½@4.27½	5.37½@5.40	5.22½@5 25
28	12⅛@12⅜	11.95@12.05	42	4.40	4.22½@4.27½	5.35@5.40	5.20@5.25
29	12⅛@12⅜	11.95@12.05	42	4.40	4.22½@4.27½	5 35@5.40	5.20@5.25
1	12¼@12⅜	11.95@12.05	42⅞	4.40	4.22½@4.27½	5 35@5.40	5.20@5.25
2	12⅛@12⅜	11.95@12.05	42¾	4.40	4.22½@4.27½	5 35@5.40	5.20@5.25
3	12⅛@12⅜	11.95@12.05	41⅞	4.40	4.22½@4.27½	5.35@5.40	5.20@5.25

The New York quotations for electrolytic copper are for cakes, ingots and wirebars, and represent the bulk of the transactions made with consumers, basis New York, cash. The prices of casting copper and of electrolytic cathodes are usually 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

LONDON

Apr.-May	Copper: Spot	Copper: 3 Mos	Copper: Best Sel'td	Tin: Spot	Tin: 3 Mos	Lead, Spanish	Zinc, Ordinaries
27	53 11/16	54 5/16	58	192¾	188½	12 1/16	24 1/8
28	53 1/16	54 5/16	58¼	193½	190¼	12⅞	24 1/8
29	.....	.....	.....	.....	.....	.....	.....
1	54 1/16	54 1/16	58	195½	192¼	12 1/16	24⅛
2	54 3/16	54 1/16	58	194¼	191¼	12⅜	24⅛
3	54 1/16	54 1/16	58	193	189¾	12⅜	24¼

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given: £10 = 2.17½c.; £12 = 2.61c.; £23 = 5c.; £60 = 13.04c. ± £1 = ± 0.21¾c.

Copper—The market continues to be quiet. Buyers in this country as well as in Europe are not well covered, but they cling to a hand-to-mouth policy. Reports from Europe are to the effect that stocks in the hands of manufacturers there are below normal. There has been no pressure to sell on the part of the producers, but there has been keen competition for such business as has been offered. The principal sellers continue to hold for 12¼c., delivered, usual terms, but the relatively small business that has been consummated has been done

at lower figures, considerable sales having been made at 12.15@12.20, c.i.f., and down to 12⅛, delivered, 30 days, and copper at the latter price has been rather freely offered throughout the week. Business in Lake copper has been insignificant. Good ordinary brands are freely offered at 12⅜c., delivered, 30 days. At the close, Lake copper is quoted at 12⅛@12⅜c., and electrolytic copper in cakes, wirebars and ingots at 11.95@12.05c. Casting copper is quoted nominally at 11¾@12 cents.

During the past week, the London market for standard copper has been more active, and advanced steadily until on Tuesday, May 2, spot was quoted at £54 3s. 9d. and three months at £54 16s. 3d. It closes at £54 1s. 3d. for spot, and £54 13s. 9d. for three months. The European statistics of the visible supply of copper show a decrease of 1535 tons during the second half of April.

Copper exports from New York for the week were 2331 long tons. Our special correspondent gives the exports from Baltimore for the week at 2108 tons.

Tin—The statistics published on May 1 were construed favorably, as they showed a decrease of about 2200 tons in the visible supplies. In consequence thereof, the London market advanced about £2. In analyzing these statistics, it appears that the decline in the visible supply was brought about by much smaller shipments from the Straits, which, however, may be a temporary condition only. Deliveries in this country were disappointingly small and reflect a falling-off in consumption. The market here moved in sympathy with that of London, being firm one day and weak the next, without, however, developing any great amount of business. Dealers are soliciting orders at below the import basis. The London market closes weak at £193 for spot, and £189 15s. for three months, while New York tin is quoted at 41⅞ cents.

Visible stocks of tin on April 30, including tin afloat: Great Britain, 7773; Holland, 1366; United States, excluding Pacific ports, 5302; total, 14,441 long tons, a decrease of 2241 tons from the March 31 report.

Lead—The market is without special feature, and there is a fair business doing from day to day on basis of 4.22½@4.27½c., St. Louis, and 4.40c., New York.

The London market is slightly easier, good Spanish lead being quoted at £12 15s., and English at £12 17s. 6d. per ton.

Spelter—The market is dull. Inquiry continues light. Prices have eased off somewhat, St. Louis being quoted at 5.20@5.25c., and New York at 5.35@5.40 cents.

The London market for good ordinaries is unchanged at £24 5s., with £24 10s. for specials.

Base price of zinc sheets $7.25 per 100 lb., f.o.b. La Salle-Peru, Ind., less 8 per cent. discount.

The National Zinc Company is building two new blocks at Bartlesville, Oklahoma.

The Bartlesville Zinc Company is going to build a five-block smeltery at Collinsville, Oklahoma.

The strike of zinc smelters at Bartlesville was settled on April 27 by the companies granting an increase of 15c. per day to the furnacemen.

The American Zinc, Lead and Smelting Company has announced the building of a six-block zinc smelter at Hillsboro, Ill., and the plant will utilize its by-product gases in the manufacture of sulphuric acid.

Other Metals

Aluminum—The market is still very quiet and quotations are unchanged at 20½@21c. per lb. for No. 1 ingots. The foreign market is reported as improving.

Antimony—The market remains quiet, with business on a small scale only. Quotations are unchanged. Cookson's is offered at 9.40@9.60c. per lb. Other prices are 9@9⅛c. for U. S.; 8¼@8½c. for Hungarian, Chinese and other outside brands.

Quicksilver—Spot supplies are again scarce, and large orders cannot be filled promptly. Quotations, however, are unchanged. At New York, sales are made at $46.50, to arrive, per flask of 75 lb. San Francisco, $46 and $43.50 for domestic and export orders, respectively. London price is £9 per flask, with £8 15s. quoted by second hands.

Imports and Exports of Metals

Exports and imports of metals in the United States, three months ended March 31, are reported as follows, in the measures usual in the trade:

Metals:	Exports	Imports	Excess
Copper, long tons	76,310	37,686	Exp. 38,624
Copper, 1910....	72,332	34,766	Exp. 37,566
Tin, long tons....	133	13,971	Imp. 13,838
Tin, 1910.....	166	13,432	Imp. 13,266
Lead, short tons.	16,941	21,132	Imp. 4,191
Lead, 1910.....	11,831	26,749	Imp. 14,918
Spelter, sh. tons.	1,964	579	Exp. 1,385
Spelter, 1910....	363	1,031	Imp. 668
Nickel, lb.....	6,121,418	7,095,441	Imp. 974,023
Nickel, 1910....	3,531,106	8,855,967	Imp. 5,324,861
Antimony, lb.....	150,704	1,950,670	Imp. 1,799,966
Antimony, 1910.	551	2,709,180	Imp. 2,708,629
Platinum, oz.....	47	24,489	Imp. 24,442
Platinum, 1910.	37	24,494	Imp. 24,457
Aluminum, value	$292,354	.....	Exp. $292,354
Aluminum, 1910	93,536	.....	Exp. 93,536
Ores, etc.:			
Zinc oxide, lb..	6,177,557	.....	Exp. 6,177,557
Zinc oxide, '10..	7,496,782	.....	Exp. 7,496,782
Zinc dross, lb....	1,177,482	.....	Exp. 1,177,482
Zinc dross, '10..	1,543,211	.....	Exp. 1,543,211
Zinc ores, lg.tons	3,006	15,457	Imp. 12,451
Zinc ores, 1910.	5,394	16,994	Imp. 11,600
Chrome ore, tons	.....	11,479	Imp. 11,479
Chrome ore, '10	20	8,284	Imp. 8,264

Copper, lead, nickel and antimony include the metal contents of ores, matte, bullion, etc. Quantity of antimony ore is not reported. Imports of aluminum are not given. The exports given above include reëxports of foreign material. Zinc contents of ores imported were 12,875,754 lb. in 1910, and 10,856,619 lb. this year.

Zinc and Lead Ore Markets

Platteville, Wis., April 29—The base price paid this week for 60 per cent. zinc ore was $40 per ton; nothing sold higher than the base price. The base price paid for 80 per cent. lead ore was $54 per ton.

SHIPMENTS, WEEK ENDED APR. 29

Camps	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville.....	949,800	.....	412,400
Mineral Point.....	757,280	.....	.....
Galena.....	684,400	.....	.....
Hazel Green.....	349,870	60,000	.....
Shullsburg.....	85,000	84,000	.....
Montfort.....	84,890	.....	.....
Cuba City.....	82,690	111,200	344,340
Linden.....	.....	75,150	80,000
Total.....	2,993,930	330,350	836,740
Year to date.....	44,579,800	2,749,285	11,368,030

Shipped during week to separating plants, 2,747,290 lb. zinc ore.

Joplin, Mo., April 29—The highest price paid for zinc sulphide ore was $44 per ton, the base ranging from $36 to $41 per ton of 60 per cent. zinc. Zinc silicate ore sold at $19@22 per ton of 40 per cent. zinc. The average price, all grades of zinc, was $37.08 per ton. The highest price paid for lead ore was $59 per ton for deliveries on last week's purchases.

SHIPMENTS, WEEK ENDED APR. 29

	Blende	Calamine	Lead Ore	Value
Webb City-Carterville	4,276,000	.....	1,169,250	$113,983
Joplin.....	1,540,520	.....	301,850	39,412
Jackson.....	946,020	.....	23,190	18,150
Miami.....	874,430	.....	79,980	16,230
Galena.....	528,320	.....	86,980	12,473
Duenweg.....	389,020	194,420	.....	9,724
Carl Junction	305,440	.....	.....	6,109
Alba-Neck.....	245,390	.....	.....	5,152
Carthage.....	270,590	.....	.....	5,141
Aurora.....	208,590	63,000	.....	4,624
Spring City..	125,990	.....	48,980	3,765
Badger.....	192,410	.....	.....	3,666
Granby.....	62,000	211,010	5,960	3,590
Oronogo.....	58,190	.....	27,180	1,848
Quapaw.....	111,640	.....	.....	1,786
Totals.....	10,134,550	468,430	1,744,070	$245,653
4 mos.....	164,038,690	10,151,500	29,048,310	$4,184,806
Blende val., the week,	$191,298;	4 mos.,		$3,258,332
Calamine, the week,	5,364;	4 mos.,		120,594
Lead, the week,	48,991;	4 mos.,		805,880

MONTHLY AVERAGE PRICES

Month	Zinc Ore				Lead Ore	
	Base Price		All Ores		All Ores	
	1910	1911	1910	1911	1910	1911
January.....	$47.31	$41.85	$45.16	$40.55	$56.99	$55.68
February....	40.69	40.21	39.47	39.16	53.64	54.46
March.....	43.60	39.85	39.71	38.45	51.26	54.77
April.....	41.00	38.88	39.33	37.47	49.72	56.37
May.....	40.19	.....	37.51	.....	48.16	.....
June.....	40.20	.....	37.83	.....	48.80	.....
July.....	39.63	.....	36.80	.....	48.59	.....
August.....	40.13	.....	37.32	.....	49.75	.....
September..	43.45	.....	39.96	.....	54.73	.....
October.....	43.31	.....	40.50	.....	53.18	.....
November...	47.20	.....	43.20	.....	54.80	.....
December...	42.50	.....	40.70	.....	55.70	.....
Year.....	$42.43	.....	$39.79	.....	$52.12	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

Purchases this week were at $56@58 per ton. The average price, all grades of lead, was $56.16 per ton.

At the Thursday night meeting of the remnant of the Producers' Association some producers asked pertinent questions concerning the contract. Heretofore the inner circle have been able to check all questions as to the disposition of the ore signed over with power of attorney to the committee of five. It is claimed now that a total of 2700 tons are signed, all of which is virtually pledged to a subsidiary company of the United States Steel Corporation. As no additional signatures have been secured it is asserted by parties who should know that at the next meeting of the executive committee the business of the association will be adjusted finally.

CHEMICALS

New York, May 3—The general market shows a little more life, but is still only moderately active.

Copper Sulphate—Spot supplies are a little better, but not yet plentiful. Quotations continue 4.25@4.50 per 100 lb. for carload lots; $4.50@4.75 per 100 lb. for smaller parcels.

Arsenic—The market remains dull and uninteresting, with prices $1.85@1.90 per 100 lb. for white arsenic.

Nitrate of Soda—Business in this article is fair. Prices remain 2.10c. per lb. for both spot and futures.

Imports and Exports—Imports and exports of chemicals and raw material in the United States, three months ended March 31:

	Imports	Exports	Excess
Copper sulph. lb.	.....	3,667,554 E.	3,667,554
Copper sul., '10	.....	2,379,816 E.	2,379,816
Bleach, lb.	27,039,572	17,368 I.	27,022,204
Bleach, 1910	25,174,702	..... I.	25,174,702
Potash salts, lb.	255,703,617	934,231 I.	254,769,386
Potash salts, '10	191,592,698	1,004,191 I.	190,588,507
Soda salts, lb.	11,170,684	170,506 I.	11,000,178
Soda salts, 1910	7,839,103	140,085 I.	7,699,018
Acetate lime, lb.	.....	18,593,334 E.	18,593,334
Acetate, 1910	.....	18,002,262 E.	18,002,262
Nit. of soda, tons	188,474	1,937 I.	186,537
Nitrate, 1910	136,982	2,121 I.	134,861
Phosphates, tons	.....	242,032 E.	242,032
Phosphates, '10	.....	196,285 E.	196,285
Sulphur, tons	6,478	453 I.	6,025
Sulphur, 1910	8,307	11,968 E.	3,661
Pyrites, tons	247,562	..... I.	247,562
Pyrites, 1910	189,273	..... I.	189,273
Magnesite, lb.	70,050,311	675,300 I.	69,375,011
Magnesite, 1910	75,240,494	1,540,792 I.	73,699,702
Sul. ammonia, lb.	84,773,818	..... I.	84,773,818
Sul. am'nia, '10	55,969,890	2,000 I.	55,967,890
Arsenic, lb.	1,137,495	..... I.	1,137,495
Arsenic, 1910	2,166,401	2,251 I.	2,164,150

Exports include reëxports of foreign material. Estimating sulphur contents of pyrites, the total imports of sulphur this year were 105,503 tons.

Potash Salts—A despatch from Berlin, Germany, says that "An agreement has been reached between the Independent potash interests in the United States and the German syndicate, through which the independents will cut loose from the American combined interests and negotiate directly with the German syndicate. The negotiations will be opened at Hamburg on May 10." This probably means that certain interests outside of the three large fertilizer companies will buy directly from the German syndicate.

MINING·STOCKS $

New York, May 3—A dull and variable market, but with only small fluctuations is about all that can be said of the general stock market.

There was one sale of Homestake, 100 shares at $85.50 per share.

On the Curb trading was also rather quiet. In the Canadian stocks McKinley-Darragh and Porcupine Central were most active. Copper stocks were slow, Braden and Giroux showing most business.

Sales at auction in New York, April 27, included 20 shares United States Steel preferred at 118¾ and 15 shares common at 72⅝; six shares Amalgamated Copper at 61⅛; 45 shares Republic Iron and Steel common at 30⅛; 10 shares American Smelting and Refining preferred at 103⅞; 18,600 shares Crown Coal and Coke, $1 par, $165 for the lot; 100 shares Ely Consolidated Copper, $10 par, $7 for the lot; 20 shares Shannon Copper, 10 par, $9.37½ per share; 100 shares Florence-Goldfield Mining, $1 par, $155 for the lot; 1500 shares Up-to-date mining, $1 par, $425 for the lot; 100 shares Newhouse Mines and Smelters, $10 each, $54 for the lot; 9855 shares Colusa-Leonard Extension Copper, $5 par, $30 for the lot; 50 shares Trinity Copper, $25 par, $3.25 per share; 2000 shares Britannia Mining, $1 par, $6 for the lot; 100 shares Yukon Gold, $5 par, $3.75 per share; 10 shares Richland Oil, $100 par, $2 for the lot; 200 shares Montgomery Shoshone Consolidated, $5 par, $12 for the lot; 100 shares Adventure Consolidated Copper, $25 par, $51 for the lot; $1000 Allis-Chalmers first-mortgage bond, $767.50; interest and title in Centennial, Appleton and Harrison Mining claims, Pahranagat Lake district, Lincoln county, Nevada, $150 for the lot.

Boston, May 2—There is a gradual awakening in the copper-share market, and prices have shown marked advances during the week. The strength and activity of the Wall Street list has also been a large contributing factor. Amalgamated has risen $3 to above $64 and is now selling ex-dividend.

Most prominent in the week's market have been advances of $15 in Calumet & Hecla to $485; $11 in Osceola to $106; $4.50 in Tamarack to $40; $6 in Mohawk to $41; $3.87½ in North Butte to $29.75; $4.25 in Arizona Commercial to $16; $6.87½ in Lake to $33.50; $3.50 in Utah Consolidated to $16; $3.25 in Granby to $33.50; $2.50 in Copper Range to $61.50; $2.50 in Butte Coalition to $18.50; $2 in Boston Corbin to $13; $1.75 in East Butte to $12; $5.50 in Old Dominion to $40.50, and $5.50 in Hancock to $23.50, the latter including the last assessment paid.

Strength and activity have also been imparted to some of the Curb stocks, not-

COPPER PRODUCTION REPORTS

Copper contents of blister copper, in pounds

Company	February	March	April
Anaconda	20,900,000	21,900,000	.....
Arizona, Ltd.	2,860,000	3,094,000	.....
Balaklala	676,605	866,670	.....
Copper Queen	7,114,278	7,333,629	6,933,422
Calumet & Ariz.	1,762,000	1,960,000	.....
Detroit	1,918,365	1,914,710	1,814,740
East Butte	1,065,000	.....	.....
Imperial	.....	.....	.....
Nevada Con.	4,992,553	5,932,259	.....
Old Dominion	1,890,000	2,563,000	.....
Shannon	1,166,000	1,322,000	1,258,000
Superior & Pitts.	1,808,000	2,540,000	.....
United Verde*	2,800,000	3,000,000	.....
Utah Copper Co.	7,329,326	7,260,267	.....
Lake Superior*	17,750,000	20,000,000	.....
Non-rep. mines*	12,600,000	12,525,000	12,125,000
Total production.	86,032,127	.....	.....
Imports, bars, etc.	23,935,222	24,345,814	.....
Total blister	109,967,349	.....	.....
Imp. in ore & matte	5,981,487	6,126,650	.....
Total	115,948,836	.....	.....
Brit. Col. Cos.:			
British Col. Copper	767,470	.....	.....
Granby	1,633,300	1,988,341	.....
Mexican Cos.:			
Boleo	2,226,560	2,700,880	.....
Cananea	3,906,000	3,542,000	.....
Moctezuma	1,950,475	2,049,150	2,315,292
Exports from:			
Chile	5,488,000	9,408,000	.....
Australia	2,744,000	4,816,000	.....

Figures are reports received from companies, unless otherwise stated. Boleo copper does not come to American refiners.
*Estimated.

STATISTICS OF COPPER.

Month.	United States Product'n.	Deliveries, Domestic.	Deliveries for Export.
IV, 1910	117,477,639	67,985,951	31,332,434
V	123,242,476	59,305,222	45,495,400
VI	127,219,188	53,363,196	65,895,948
VII	118,370,003	56,708,175	59,407,167
VIII	127,803,618	67,731,271	61,831,780
IX	119,519,983	64,501,018	75,106,496
X	126,469,284	67,814,172	68,186,912
XI	119,353,463	60,801,992	67,424,316
XII	123,339,219	43,594,018	88,104,075
Year 1910	1,452,122,120	749,426,542	722,431,494
I, 1911	115,696,591	42,078,567	53,208,739
II	109,828,297	50,518,998	45,111,019
III	130,532,080	66,080,789	59,081,127
IV	.....	.....	.....

	VISIBLE STOCKS.		
	United States.	Europe.	Total.
V, 1910	141,984,159	246,870,400	388,854,559
VI	160,425,973	239,142,400	399,568,373
VII	168,386,017	232,892,800	401,278,818
VIII	170,640,678	222,320,000	392,960,677
IX	168,881,245	218,444,800	387,326,045
X	148,793,714	211,276,800	360,070,514
XI	139,261,914	198,060,800	337,322,714
XII	130,389,069	193,200,000	323,589,069
I, 1911	122,030,195	236,629,120	358,649,315
II	142,439,490	236,992,000	379,431,190
III	156,637,770	233,385,600	390,023,370
IV	162,007,934	223,014,400	385,022,334
V	.....	212,284,800	.....

Figures are in pounds of fine copper. U. S. production includes all copper refined in this country, both from domestic and imported material. Visible stocks are those reported on the first day of each month, as brought over from the preceding month. From Jan. 1, 1911, stocks at Hamburg and Rotterdam are included in the visible stocks for Europe.

ably New Baltic, in which the advance was due to advices that good copper ore had been struck in the shaft, which is down 300 ft. Bohemia also showed some strength as did South Lake, Chino and a few others. Amalgamated-Nevada, in the penny stocks, broke from 12½ to 8c., recovering partially.

Assessments

Company	Delinq	Sale	Amt
Alpha Con., Nev.	May 9	May 31	$0.05
Andes, Cal.	May 2	May 23	0.10
Amer. M. Co., Ida.	May 6	May 27	0.001
Bell, Ida.	Apr. 29	June 6	0.04
Best & Belcher, Nev	May 17	June 6	0.10
Bonanza Mountain, Ida.	Apr. 28	May 27	0.001
Challenge, Cal.	Apr. 26	May 27	0.05
Confidence, Nev.	May 11	May 31	0.20
Ely Consolidated, Nev.	May 2	June 22	0.05
Exchequer, Cal.	Apr. 26	May 18	0.05
Gould & Curry, Nev.	May 12	June 1	0.10
Log Cabin, Ida.	Apr. 24	May 24	0.006
Miner Inv. Co., Ida.	Apr. 28	May 27	0.0015
Overman, Nev	May 17	June 7	0.05
Potosi, Nev.	May 8	May 31	0.10
Scorpion, Nev.	May 4	May 24	0.03
Seven Troughs, Nev.	May 15	June 2	0.0025
Sierra Nevada, Nev.	May 4	May 25	0.10
Silver Shield, Utah.	May 16	June 3	0.015
Swansea Consolidated, Utah	May 15	June 7	0.01
Trans.-Continental, Ida.	May 3	May 27	0.002
Union Con., Nev.	Apr. 11	May 3	0.10
Utah-Arizona, Ariz.	May 20	May 31	0.005
Utah Consolidated, Utah.	May 20	June 10	0.01
Yankee Con., Utah	May 1		0.02
Yellow Jacket, Nev	May 8	June 8	0.10

Monthly Average Prices of Metals

SILVER

Month.	New York.			London.		
	1909.	1910.	1911.	1909.	1910.	1911.
January	51.750	52.375	53.795	23.843	24.154	24.865
February	51.472	51.534	52.222	23.706	23.794	24.081
March	50.468	51.454	52.745	23.227	23.690	24.324
April	51.428	53.221	53.325	23.708	24.483	24.595
May	52.905	53.870		24.343	24.797	
June	52.538	53.462		24.166	24.651	
July	51.043	54.150		23.519	25.034	
August	51.125	52.912		23.588	24.428	
September	51.440	53.295		23.743	24.567	
October	50.923	55.490		23.502	25.596	
November	50.703	55.635		23.351	25.680	
December	52.226	54.428		24.030	25.160	
Total	51.502	53.486		23.706	24.670	

New York, cents per fine ounce; London, pence per standard ounce.

COPPER

	New York.				London, Standard.	
	Electrolytic		Lake.			
	1910.	1911.	1910.	1911.	1910.	1911.
January	13.620	12.295	13.870	12.680	60.923	55.604
February	13.332	12.256	13.719	12.611	59.388	54.970
March	13.255	12.139	13.586	12.447	59.214	54.704
April	12.733	12.019	13.091	12.275	57.238	54.035
May	12.550		12.885		56.313	
June	12.404		12.798		55.310	
July	12.215		12.570		54.194	
August	12.490		12.715		55.733	
September	12.379		12 668		55.207	
October	12.553		12.788		56.722	
November	12.742		12.914		57.634	
December	12.581		12.863		56.769	
Year	12.738		13.039		57.054	

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

TIN AT NEW YORK

Month.	1910.	1911.	Month.	1910.	1911.
January	32.700	41.255	July	32.695	
February	32.920	41.614	August	33.972	
March	32.403	40.157	September	34.982	
April	32.976	42.185	October	36.190	
May	33.125		November	36.547	
June	32.769		December	38.199	
			Av. Year	34.123	

Prices are in cents per pound.

LEAD

Month.	New York.		St. Louis.		London.	
	1910.	1911.	1910.	1911.	1910.	1911.
January	4.700	4.483	4.582	4.334	13.650	13.009
February	4.613	4.440	4.445	4.266	13.328	13.043
March	4.459	4.394	4.307	4.238	13.063	13.122
April	4.376	4.412	4.225	4.262	12.641	12.889
May	4.315		4.164		12.550	
June	4.343		4.207		12.688	
July	4.404		4.291		12.531	
August	4.400		4.290		12.513	
September	4.400		4.289		12.582	
October	4.400		4.271		13.091	
November	4.442		4.314		13.217	
December	4.500		4.363		13.197	
Year	4.446		4.312		12.920	

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month.	New York.		St. Louis.		London.	
	1910.	1911.	1910.	1911.	1910.	1911.
January	6.101	5.452	5.951	5.302	23.350	23.887
February	5.569	5.518	5.419	5.368	23.188	23.276
March	5.637	5.563	5.487	5.413	23.031	23.016
April	5.439	5.399	5.289	5.249	22.469	23.743
May	5.191		5.041		22.100	
June	5.128		4.978		22.094	
July	5.152		5.002		22.406	
August	5.279		5.129		22.800	
September	5.514		5.364		23.165	
October	5.628		5.478		23.900	
November	5.976		5.826		24.083	
December	5.624		5.474		24.019	
Year	5.520		5.370		23.050	

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PIG IRON AT PITTSBURG.

	Bessemer.		Basic.		No. 2 Foundry.	
	1910.	1911.	1910.	1911.	1910.	1911.
January	$19.90	$15.90	$17.98	$14.40	$17.94	$14 75
February	18.96	15.90	17.21	14.50	17.38	14.81
March	18.53	15.90	16.93	14.65	17.00	14.96
April	18.28	15.90	16.84	14.65	16.75	15.00
May	17.10		15.94		16.18	
June	16.52		15.60		15.53	
July	16.40		15.40		15.40	
August	16.09		14.89		15.16	
September	15.92		14.73		14.93	
October	15.90		14.05		14.88	
November	15.84		14.26		14.78	
December	15.90		14.15		14.65	
Year	$17.10		$15.65		$15.83	

STOCK QUOTATIONS

COLO. SPRINGS May 2

Name of Comp.	Bid.
Acacia	.03
Cripple Cr'k Con.	.01½
C. K. & N.	‡.14
Doctor Jack Pot	.05
Elkton Con.	.59½
El Paso	.59½
Findlay	‡.05
Gold Dollar	.10½
Gold Sovereign	.02
Isabella	.10
Jack Pot	.05
Jennie Sample	.10
Lexington	‡.01
Moon Anchor	.02½
Old Gold	.03
Mary McKinney	.26
Pharmacist	‡.01½
Portland	.99
Vindicator	.79½
Work	.02

SALT LAKE May 2

Name of Comp.	Bid.
Beck Tunnel	.32
Black Jack	.16
Carisa	.18
Cedar Talisman	.05
Colorado Mining	.49
Columbus Con.	.42
Daly Judge	‡4.45
Grand Central	.85
Iron Blossom	1.17½
Little Bell	.45
Lower Mammoth	.10½
Mason Valley	8.00
May Day	.16½
Nevada Hills	3.00
New York	.13
Prince Con	.52
Silver King Coal'n	1.60
Sioux Con.	.32
Uncle Sam	.69
Yankee	.16

TORONTO May 2

Name of Comp.	Bid	Name of Comp.	Bid
Coniagas	7.15	Dome Exten	.51
Hudson Bay	.98	Pearl Lake	.49
Temiskaming	.71	Dobie	3
Wettlaufer-Lor.	.94	West Dome	2.15
Hollinger	10⅞	Standard	.20
Preston E. D.	.34½	Apex	.16
Porcu. Gold	.52	Canada	1.12
Porcu. Tisdale	.13½	Crown Char.	‡.52
Imperial	.19	Coronation	.33
Central	.73½	Swastika	.53½

SAN FRANCISCO May 2.

Name of Comp.	Clg.	Name of Comp.	Bid
COMSTOCK STOCKS		MISC. NEV. & CAL.	
Alta	.10	Belmont	5.10
Belcher	.90	Jim Butler	.26
Best & Belcher	.38	MacNamara	.12
Caledonia	.33	Midway	.27
Challenge Con.	.20	Mont.-Tonopah	.83
Chollar	.16	North Star	.12
Confidence	.60	West End Con.	.55
Con. Virginia	1⅛	Atlanta	.09
Crown Point	.14	Booth	.07
Gould & Curry	.14	C.O.D. Con	.07
Hale & Norcross	.23	Comb. Frac.	.09
Mexican	4.72½	Jumbo Extension	.27
Occidental	.55	Oro	.04
Ophir	1.70	Silver Pick	.04
Overman	.35	St. Ives	.16
Potosi	¼	Tramps Con	.02
Savage	.28	Argonaut	‡1.70
Sierra Nevada	.59	Bunker Hill	7.12
Union Con.	1½	Cent. Eureka	1.40
Yellow Jacket	.55	So. Eureka	7½

N. Y. EXCH. May 2

Name of Comp.	Clg.
Amalgamated	63
Am. Agri. Chem.	57
Am.Sm.&Ref.,com	75½
Am. Sm.& Ref., pf.	105¼
Anaconda	38¾
Batopilas Min	2
BethlehemSteelpf	62
Chino	24⅛
Comstock Tunnel	.26
Federal M.& S., pf.	60
Goldfield Con	6½
Great Nor., ore ctf.	61
Homestake	85
Miami Copper	20
Nat'nalLead,com.	52¾
National Lead, pf.	106
Nev. Consol	18¾
Pittsburg Coal, pf.	79½
Ray Con	17⅞
RepublicI&S,com.	32½
Republic I & S, pf.	95
SlossSheffi'd,com.	49½
Sloss Sheffield, pf.	112
Tennessee Copper	37⅜
Utah Copper	45⅛
U. S. Steel, com.	76
U. S. Steel, pf.	119½
Va. Car. Chem.	63½

N. Y. CURB May 2

Name of Comp.	Clg.
Ariz.-Cananea	‡3⅜
Barnes King	‡.18
Braden Copper	4
B. C. Copper	5¼
Buffalo Mines	2.10
Butte Coalition	18¼
Caledonia	‡⅞
Calumet & Mont.	‡.20
Cobalt Central	.06
Con. Ariz. Sm.	1¼
Davis-Daly	1½
Ely Con	⅛
Florence	1⅜
Giroux	6¼
Greene Cananea	6⅜
Greenwater	‡.06
Guanajuato	3¼
Guerrero	‡1⅛
Guggen. Exp.	190
Inspiration	7¾
Internat. S. & R.	‡124
Kerr Lake	6¼
La Rose	4¾
McKinley-Dar-Sa.	1¾
Min. Co. of A. new	‡4⅜
Moneta Porc.	.16
Mont. Shoshone	‡.04
Nev. Utah M. & S.	⅜
Nipissing Mines	10¾
Ohio Copper	1⅛
Pacific Sm. & M.	¾
Precious Metals	½
Ray Central	1⅛
Red Warrior	‡1⅛
South Utah M. & S.	⅛
Standard Oil	677
Stewart	1¼
Tonopah	6⅛
Tonopah Ex.	1⅜
Tri-Bullion	⅛
Tularosa	⅞
Union Mines	¾
Yukon Gold	3⅛

LONDON May 3

Name of Com.	Clg.
Camp Bird	£1 13s 9d
Dolores	1 10 0
El Oro	1 4 6
Esperanza	1 13 9
Mexico Mines	7 12 6
Oroville	0 6 0
Stratton'sInd.	0 2 3
Tomboy	0 15 6

BOSTON EXCH. May 2

Name of Comp.	Clg.
Adventure	5¾
Algomah	7¾
Allouez	33
Am. Zinc	25⅛
Arcadian	‡2¼
Arizona Com.	15⅜
Atlantic	5¼
Bonanza	¾
Boston & Corbin	13
Butte & Balak	5¾
Calumet & Ariz.	51⅛
Calumet & Hecla	485
Centennial	12¼
Con. Mercur	.07
Copper Range	62
Daly-West	‡4½
East Butte	11¾
Franklin	10
Granby	33½
Hancock	22
Hedley Gold	15
Helvetia	1¼
Indiana	12⅞
Isle Royale	14½
Keweenaw	2
Lake	32¾
La Salle	4
Mass	6
Michigan	2⅜
Mohawk	40
New Arcadian	37⅛
North Butte	28¾
North Lake	7
Ojibway	6
Old Dominion	40½
Osceola	102
Parrot	11¼
Quincy	70½
Shannon	10⅞
Shattuck-Ariz.	20
Superior	33
Superior & Bost.	5
Superior & Pitts.	14⅜
Tamarack	39
Trinity	4
U. S. Smelting	34½
U. S. Smelt'g, pf.	46¾
Utah Apex	2¾
Utah Con.	15
Victoria	2
Winona	7
Wolverine	110
Wyandot	1¼

BOSTON CURB May 2

Name of Comp.	Last
Ahmeek	165
Bingham Mines	1½
Boston Ely	1
Boswyocolo	.08
Cactus	.12
Calaveras	2
Champion	.01
Chief Cons	1½
Corbin	3⅛
Cortez	1⅞
Crown Reserve	3½
First Nat. Cop.	1⅛
Live Oak	17
Mackinaw	‡.02
Majestic	.41
Nat'l Mine & Ex.	.02
Nevada-Douglas	2
Oneco	1⅜
Raven Copper	.20
Rhode Island Coal	3½
San Antonio	‡3½
South Lake	6
Trethewey	.96
Tuolumne Copper	4¾
United Zinc, pfd.	2
Vulture	6½
Yuma	‡.02

‡Last quotation.

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Corundum	"	.07@.10
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Emery, in kegs; Turkish flour	"	.01½@.02
Grains	"	.03½@.04
Naxos flour	"	.01½@.02
Grains	"	.03½@.04
Chester flour	"	.01½@.02
Grains	"	.03½@.04
Peekskill flour, f.o.b. Easton, Pa.	"	.01½@.01¾
Grains, in kegs	"	.02¾@.03
Garnet, per quality	sh. ton.	25.00@35.00
Pumice Stone, Am. Powd., 100 lb.		1.60@2.25
Italian, powdered	per lb.	.01¾@.01¾
Lump, per quality	"	.03½@.30
Rottenstone, ground	"	.02@.04
Lump, per quality	"	.05@.20
Rogue, per quality	"	.05@.30
Steel Emery, f.o.b. Pittsburg	"	.07@.07½
ACIDS—		
Acetic 28%	lb.	.0162@.0175
Boric	"	.07
Hydrofluoric, 30%	"	.02¾@.03½
" 48%	"	.06
" 52%	"	.06½
" 60%	"	.10
Hydrochloric acid, 20° per 100 lb.		1.25@1.50
Nitric acid, 36° to 40°	per lb.	.03½@.04½
Sulphuric acid, 50°, bulk per ton.		$12 up
60°, 100 lb. in carboys.		.85@1.12½
60°, bulk, ton		16.00@18.00
66°, 100 lb. in carboys.		1.00@1.10
66°, bulk, ton		18.00
Oxalic	per lb.	.072@.0775
ALCOHOL—Grain 95%	gal.	2.52@2.56
Denatured	"	.42
Refined wood, 95@97%	"	.52@.57
ALUM—Lump	100 lb.	$1.75
Ground	"	1.85
Chrome Alum	"	.04½@.05
ALUMINUM—Sulphate, com'l.	lb.	.90@2.00
AMMONIA—24 deg. lb.	"	.04½@.05½
" 26 deg. lb	"	.04¾@.05¼
AMMONIUM—		
Bromide	lb.	.32
Carbonate	"	.08@.08¾
Muriate grain	"	.05½@.06
Lump	"	.09½@.09¾
Sulphate, 100 lb	"	3.10@3.15
Sulpho-cyanide com	"	.25
" " chem. pure	"	.35
ANTIMONY—needle, powder.	lb.	.04½@.05
Oxide	"	.08¾@.10
ARSENIC—white	"	.01⅞@.02
Red, Outside brands	"	.05½@.06½
Saxony	"	.06¼@.06¾
ASPHALTUM—		
Barbadoes	per ton.	100.00@170.00
West Indies	"	30.00@60.00
Egyptian	lb.	.30@.40
Gilsonite, Utah ordinary	per ton.	40.00@50.00
Trinidad	"	25.00@30.00
California	per ton.	22.50@30.00
BARIUM—		
Carb. Lump. 80@90%	lg. ton.	26.00@35.00
Precipitated, 96@98%	"	31.00@33.00
Powdered, natural	lb.	.02@.02½
Chloride com'l	ton.	34.00@37.00
Nitrate powdered, in casks	lb.	.04¾@.05¾
Blanc Fixe, dry, bbl	per lb.	.02¾@.04
BARYTES—		
Am. Ground	sh. ton.	12.00@13.00
Floated	"	16.00@17.00
Foreign floated	"	18.50@22.50
BLEACHING POWDER—35% 100 lb		1.25@1.40
BLUE VITRIOL—(copper sulphate), carload, per 100 lb.		4.25@4.50
BONE ASH	lb.	.02½@.04
BORAX, sacks	"	.03½@.04
CALCIUM Acetate, gray,	100 lb.	2.00@2.05
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton.	65.00
Chloride, f.o.b. N. Y.	"	11.00@14.10
CEMENT—Slag cement	bbl.	.75@1.25
Portland, Am. 400 lb	"	1.20@1.30
Foreign	"	2.25@2.90
"Rosendale," 300 lb.	"	.85
(in sacks)	"	.65
CHROME ORE—		
New Caledonia 50% ex. ship N. Y.	per lg. ton.	14.00@16.00
Bricks, f.o.b. Pittsburg, per M.		175.00
CLAY, CHINA—Am. common ex-dock, N. Y.	ton.	8.00@9.00
Foreign	"	11.50@18.00
COBALT—Oxide	lb.	.80@.85
COPPERAS—Bulk	100 lb.	$0.55
In bbls	"	.65@.85
In bags	"	.60@.80
CRYOLITE (carload)	lb.	.06½@.07
FELDSPAR—Ground	sh. ton.	6.00@14.00
FIRE BRICK—		
American	per M.	30.00@40.00
Imported	"	30.00@45.00
St. Louis	"	16.00
Extra	"	20.00@23.00
Special extra	"	30.00@35.00
FIRE CLAY—F.o.b. St. Louis.		
St. Louis, extra quality, per ton.		5.00
" ordinary	"	2.50
FLUORSPAR—		
Domestic f.o.b. Pittsburg:		
Lump	ton.	8.00@10.00
Ground	"	12.00@14.00
Foreign crude ex. dock	"	8.50
FULLER'S EARTH—Lump,	100 lb.	.80@.85
Powdered	"	.80@.85
GRAPHITE—Ceylon.		
Flying dust, finest to best	lb.	.02@.04
Dust	"	.02½@.05
Chip	"	.04@.08
Lump	"	.05½@.12
Large lump	"	.08¼@.10½
GYPSUM—		
Fertilizer	sh. ton.	5.00
Ground	"	4.00@7.00
INFUSORIAL EARTH—		
Ground Am. Best	lb.	.01½@.02½
German	"	.02¼@.02¾
LEAD—Acetate (sugar of) brown,	lb.	.07¼@.09½
Nitrate, com'l	"	.08¼
MAGNESITE—Greece.		
Crude (95%)	lg. ton.	7.50@8.50
Calcined, powdered	sh. ton.	26.00@37.00
Brick, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l	100 lb.	.90@1.25
Sulphate (Epsom salt)	100 lb.	.90@1.00
MANGANESE—		
Foreign, crude, powdered:		
70@75% binoxide	lb.	.006@.01
75@85% binoxide	"	.011@.015
85@90% binoxide	"	.01½@.04
90@95% binoxide	"	.06¼@.08½
Ore, 80%-85%	sh. ton.	12.00@25.00
MARBLE—Flour	sh. ton.	9.00@9.50
MINERAL WOOL—		
Slag, ordinary	sh. ton.	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
MONAZITE SAND—		
Guar. 97%, with 5% Thorium oxide, normal	lb.	.08 and up
NICKEL—		
Oxide, crude, lb. (77%) for fine metal contained		.47
Sulphate, single	lb.	.10½@.11
Sulphate, double	"	.05⅞@.08
NITRATE OF SODA—		
100 lb. 95% (spot)		2.10
95% (future)		2.10
96% is 2¼@7½c. higher per 100 lb.		
OZOKERITE—best	lb.	.12@.16
PAINTS AND COLORS—		
Litharge, Am. powdered	lb.	.05½@.06
English glassmakers'	"	.08¼@.09½
Lithophone	"	.03½@.04
Metallic, brown	sh. ton.	16.50@22.00
Red	"	14.00@18.00
Ocher, Am. common	"	10.00@15.00
Best	"	12.00@15.00
Dutch, washed	lb.	.02½@.03
French, washed	"	.01½@.02
Paris green, pure, bulk	"	13@.18½
Red lead, American	"	.06½@.07½
Foreign	"	.08½@.09
Turpentine, spirits bbl.,	per gal.	.80@.90
White lead, Am., dry	lb.	.05½@.06
American, in oil	"	.07@.07½
Foreign, in oil	"	.09½@.10
Zinc white, Am. extra dry	"	.05⅝@.06½
French, proc's, red seal, dry	"	.08¼@.08½
French, process, green seal, dry	"	.10½@.10½
PHOSPHATES—Acid		60@62c. per unit
*Fla., hard rock 77%		5.75@6.25
land pebble 68%		3.75@4.00
†Tenn., 78@80%		5.00@5.50
75%		4.75@5.00
68@72%		4.25@4.50
‡So. Car. land rock 60%		3.50@3.75
POTASSIUM—		
Bicarbonate crystal	lb.	$.07½@.08
Powdered or granulated	"	.08@.08¼
Bichromate, Am.	"	.07¾@.08
Scotch	"	.10¼
Bromide	"	.20
Carbonate (80@85%)	"	.03½@.04¼
Caustic, ordinary	"	.03¾@.05¼
Elect. (90% KOH)	"	.05½@.06
Chloride (muriate), 100 lb.		1.90
Chlorate, powdered	"	.08½@.09½
Crystals	"	.09@.09¾
Cyanide (98@99%)		
Carloads (30,000 lb.)	"	18c.
5-ton lots		18½c.
Less than 5 tons		.19
Kainite, long ton, bulk, 7.50; bags,		8.50
Permanganate	lb.	.09½@.10½
Prussiate, yellow	"	.13@.13½
Red	"	.26@.30
Sulphate (basis 90%)	100 lb.	2.18@2.21
PYRITE—		
Domestic, non-arsenical, furnace size, f.o.b. R. R.	per unit.	.11½@.12
Domestic, non-arsenical, fines, per unit, f.o.b. mines		.10¾@.11
Imported, non-arsenical, furnace size, ex-ship, per unit		.13
Imported, arsenical, furnace size, ex-ship, per unit		.12@.12½
Imported fines, arsenical, ex-ship,		.09½@.10
Imported fines, non-arsenical, ex-ship, per unit		.10½@11

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SALT—N. Y. com. fine 280 lb. bbl.		.72@1.13
N. Y. agricultural	sh. ton.	3.80@4.50
SALTPETER—Crude	100 lb.	4.00@4.50
Refined, crystals	"	5.00@5.75
SILICA—		
Ground quartz, ord'ry.	lg. ton	7.00@15.00
Silex, ground	"	7.00@15.00
Silex, floated	"	35.00@40.00
Lump quartz	"	5.00@5.50
Glass sand	"	2.75
SILVER—Nitrate, crystals	oz.	.33½@.36¾
SODIUM—Acetate	lb	.04½@.05
"Alkali," per 100 lb., 58/48		.90@.95
Bicarb. soda, per 100 lb		1.00@1.30
Soda, caustic, per 100 lb., 78/60		1.80@2.00
Soda, caustic, powdered		.02½@.03
Salt cake, per 100 lb., bulk		.50@.60
Salt cake, bbl		.67½@.80
Soda, monohydrate, per lb.		1.30@1.75
Bichromate	lb.	.05¼@.06¼
Bromide	"	.20
Chlorate, com'l	"	.08¼@.09½
Cyanide, 120-130% KCN, per 100%		
Carloads (30,000 lb.)	lb.	18c.
5-ton lots	"	18½c.
Less than 5 tons	"	.20
Hyposulphite, Am.	"	1.30@1.50
Phosphate	100 lb.	2.10@2.40
Prussiate	"	.08@.08¾
Sal soda, f.o.b. N. Y.	"	.60@.75
Foreign, f.o.b. N. Y.	"	.80@1.00
Silicate, com'l	"	.65@1.00
Sulphate, com'l (Glauber's salt)	100 lb.	.60@.80
Sulphate, com'l, calcined		.65@.85
STRONTIUM—Nitrate	lb.	.07@.08
SULPHUR—Louisiana (prime) to New York	lg. ton.	22.00 up
To Boston, Philadelphia or Baltimore	"	22.50 up
Roll	100 lb.	1.85@2.15
Flour	"	2.00@2.40
Flowers, sublimed	"	2.20@2.60
Powdered commercial, bags		1.55
Sicilian, extra qual., unmixed seconds, crude brimstone to New York	lg. ton.	$22.00
TERRA ALBA—Fr. & Eng.	100 lb.	.75@1.10
TALC—Domestic	sh. ton.	15.00@25.00
French	"	*40.00@45.00
Italian, best	"	*50.00

*Pending tariff appeal.

TIN—Bi-chloride, 50°	lb.	.12½
Crystals	"	.27
Oxide, lb.	"	.45
URANIUM—Oxide	"	2.20@4.25
ZINC—Chloride sol., com. 20°	"	.02½
Chloride, granular	"	.04@.04½
Dust	"	.06½@.07
Sulphate	"	.02@.02½

*Fla., hard rock 77%, land pebble 68%, †Tenn., 78@80%, 75%, 68@72%, ‡So. Car. land rock 60%: 5.75@6.25; 3.75@4.00; 5.00@5.50; 4.75@5.00; 4.25@4.50; 3.50@3.75

*F.o.b. Florida or Georgia ports. †F.o.b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

NOTE—These quotations are for ordinary wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. In the cases of some of the important minerals, such as phosphate rock, pyrites and sulphur, in which there are well established markets, the quotations are substantially representative. But in the cases of some of the minor mineral products, the quotations represent what dealers ask of consumers and not what producers can realize in selling their output on private contract.